LANE MEDICAL LIBRARY STANFORD
L261 .A56 1927 OLD
Cancer control : report of an internatio

CANCER CONTROL

LAKE MOHONK CONFERENCE • 1926

LANE
MEDICAL LIBRARY
SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
1885
GIFT
American Society for the
Control of Cancer
AMERICAN BANK NOTE CO. LITHO.

CANCER CONTROL

Digitized by the Internet Archive
in 2025

https://archive.org/details/cancercontrol0000vari

CANCER CONTROL

REPORT OF
AN INTERNATIONAL SYMPOSIUM
HELD UNDER THE AUSPICES
OF THE

AMERICAN SOCIETY FOR THE CONTROL OF CANCER

LAKE MOHONK, NEW YORK, U. S. A.
September 20-24, 1926

THE SURGICAL PUBLISHING COMPANY
OF CHICAGO

1927

LANE LIBRARY

COPYRIGHT, 1927
BY THE
SURGICAL PUBLISHING COMPANY
OF CHICAGO

1927

CONTENTS

GENERAL ACCOUNT OF THE SYMPOSIUM

The Call for the Meeting 1
The Meeting Place 2

OPEN SESSION

1. The Purpose and Plan of the Meeting. *George A. Soper, Ph.D., New York City* 5
2. Greeting of the Foreign Guests on Behalf of the American Medical Profession. *William H. Welch, M.D., Baltimore, Maryland* 11
3. Response on Behalf of the Foreign Guests. *Sir John Bland-Sutton, Bt., London, England* 14

(For "The Prevention of Cancer" by James Ewing, M.D., presented at the open session of September 22, see papers of the executive sessions below.)

EXECUTIVE SESSIONS

4. The Value of Co-Ordinated Effort among Surgeons, Pathologists, and Others in the Control of Cancer. *Sir John Bland-Sutton, Bt., London, England* 17
5. Cancer Education in England. *W. Sampson Handley, F.R.C.S., London, England* 22
6. The Organized Movement against Cancer in France. *Professor Henri Hartmann, Paris, France* 31
7. The Organization and Practical Working of the Centers against Cancer in France. *Professor Léon Bérard, Lyons, France* 39
8. The Need of Special Institutions for the Investigation and Treatment of Cancer as Compared with Other Methods of Dealing with Cancer Patients. *Professor T. Marie, Toulouse, France* 47
9. The Campaign against Cancer in Switzerland. *Professor Charles DuBois, Geneva, Switzerland* 60
10. Morbidity Statistics of the Anti-Cancer Center at Geneva. *Dr. Albert Reverdin, Geneva, Switzerland* 66
11. The Anti-Cancer Campaign in Belgium. *Professor J. Maisin, Louvain, Belgium* 68
12. Cancer in Denmark. *Professor Johannes Fibiger, Copenhagen, Denmark* 77
13. The Movement in Italy for the Control of Cancer. *Professor Raffaele Bastianelli, Rome, Italy* 87

66408

14. THE ORGANIZED MOVEMENT FOR CANCER CONTROL IN GERMANY. *Professor Ferdinand Blumenthal, Berlin, Germany* 93
15. CANCER OF THE STOMACH. *Donald C. Balfour, M.D., Rochester, Minnesota* 103
16. THE RADIOLOGICAL TREATMENT OF CANCER. *Robert B. Greenough, M.D., Boston, Massachusetts* 108
17. WHAT IS THE VALUE AND WHAT SHOULD BE THE ORGANIZATION AND EQUIPMENT OF INSTITUTIONS FOR THE TREATMENT OF CANCER BY RADIUM AND X-RAYS. *Professor Claude Regaud, Paris, France* 116
18. THE WORK OF DIAGNOSING AND TREATING CANCER IN GERMANY. *Dr. Robert Bierich, Hamburg, Germany* 141
19. THE ORGANIZED MOVEMENT FOR THE CONTROL OF CANCER IN AMERICA. *George A. Soper, Ph.D., New York City* 148
20. THE EVIDENCE OF THE VALUE OF EDUCATION IN THE CONTROL OF CANCER. *Joseph Colt Bloodgood, M.D., Baltimore, Maryland* 155
21. THE PREVENTION OF CANCER. *James Ewing, M.D., New York City* 165
22. HOW WE SHOULD REGARD THE NEW THEORIES OF THE ORIGIN OF CANCER. *Professor Gustave Roussy, Paris, France* 185
23. THE TISSUE AND RACIAL SPECIFICITIES OF CANCER. *Dr. J. A. Murray, F.R.S., London, England* 195
24. THE CLINICAL VALUE OF CERTAIN PHASES OF CANCER RESEARCH. *Francis Carter Wood, M.D., New York City* 201
25. THE PRACTICAL VALUE OF RESEARCHES INTO THE CAUSES OF CANCER. *Dr. Archibald Leitch, London, England* 208
26. THE PREVALENCE OF CANCER AS REVEALED BY MORTALITY RETURNS AND AT AUTOPSY. *Professor W. M. de Vries, Amsterdam, Holland* 217
27. THE MORTALITY FROM CANCER AMONG PEOPLE OF DIFFERENT RACES. *Dr. H. J. Deelman, Groningen, Holland* 247
28. THE CHANCE OF DEATH FROM CANCER. *Louis I. Dublin, Ph.D., New York City.* 274
29. CANCER AS A SPECIALTY. *George H. Semken, M.D., New York City* 281
30. NEWSPAPER PUBLICITY IN THE CONTROL OF CANCER. *Harry C. Saltzstein, M.D., Detroit, Michigan* 299
31. THE RELATION OF THE GENERAL PRACTITIONER TO THE CANCER PROBLEM. *Howard Lilienthal, M.D., New York City* 308
32. PROFESSOR W. BLAIR BELL'S METHOD OF TREATING CANCER. *Francis Carter Wood, M.D., New York City* 318

FORMAL RESOLUTIONS

FORMAL RESOLUTIONS PASSED BY THE SYMPOSIUM 327
THE FINAL DINNER 335

EUROPEAN GUESTS AT THE MOHONK SYMPOSIUM

PROFESSOR RAFFAELE BASTIANELLI, Rome, Italy
Associate Professor of Surgery, University of Rome
Vice-President of the Italian League for the Control of Cancer

PROFESSOR LÉON BÉRARD, Lyons, France
Director of the Anti-Cancer Center at Lyons
Professor of Surgery, University of Lyons

DR. ROBERT BIERICH, Hamburg, Germany
Director of the Institute for Cancer Control at Hamburg
Lecturer on Cancer Research, Hamburg University

SIR JOHN BLAND-SUTTON, BT., London, England
President of the Royal College of Surgeons
Vice-Chairman of the British Empire Cancer Campaign

PROFESSOR FERDINAND BLUMENTHAL, Berlin, Germany
Director of the Cancer Institute at Berlin
Professor of Internal Medicine, University of Berlin

PROFESSOR H. T. DEELMAN, Groningen, Holland
Director of the Institute of Pathology and Pathologic Anatomy
Professor of Pathology, University of Groningen

PROFESSOR WILLIAM DEVRIES, Amsterdam, Holland
President of the Netherlands Cancer Institute
Professor of Pathologic Anatomy, University of Amsterdam

MR. W. SAMPSON HANDLEY, F.R.C.S., London, England
Surgeon to the Middlesex Hospital; Professor of Surgery and Pathology, Royal College of Surgeons of England

PROFESSOR HENRI HARTMANN, Paris, France
Professor of Surgery, University of Paris
Director of the Anti-Cancer Center at the Hôtel Dieu, Paris

DR. ARCHIBALD LEITCH, London, England
Director of the Cancer Hospital Research Institute

PROFESSOR J. MAISIN, Louvain, Belgium
Director of the Cancer Institute of the University of Louvain
Professor at the University of Louvain

PROFESSOR T. MARIE, Toulouse, France
Professor at the Medical College of the University of Toulouse
Director of the Anti-Cancer Center at Toulouse

DR. JAMES A. MURRAY, London, England
Fellow of the Royal Society; Director of the Imperial Cancer Research Fund

DR. CLAUDE REGAUD, Paris, France
Director of the Pasteur Laboratory of the Radium Institute

DR. ALBERT REVERDIN, Geneva, Switzerland
General Secretary and Treasurer of the Anti-Cancer Center of Geneva
Member of the Swiss Anti-Cancer League

PROFESSOR GUSTAVE ROUSSY, Paris, France
Professor at the Medical School of the University of Paris
Director of the Institute for Research and Treatment of Cancer at Villejuif (Suburban Paris)

AMERICAN GUESTS AT THE MOHONK SYMPOSIUM

Dr. Frank Adair, New York City
Associate Attending Surgeon, Memorial Hospital
Assistant Surgeon, Hospital for the Ruptured and Crippled

Dr. R. J. Behan, Pittsburgh, Pennsylvania
Surgeon to St. Joseph's Hospital; Director of Cancer Department, Pittsburgh Skin and Cancer Foundation

Dr. Herbert M. Bergamini, New York City
Assistant Visiting Surgeon, Reconstruction and Bellevue Hospitals

Dr. Joseph C. Bloodgood, Baltimore, Maryland
Associate Professor of Clinical Surgery, Johns Hopkins University School of Medicine

Dr. William Borden, Washington, D. C.
Professor of Surgery and Dean of Medical Department, George Washington University; Surgeon-in-Chief, George Washington Hospital

Dr. James T. Case, Battle Creek, Michigan
Professor of Roentgenology, Northwestern University Medical School
Director, Roentgenological Department, Battle Creek Sanitarium

Dr. H. R. Charlton, Bronxville, New York
Adjunct Assistant Surgeon, Woman's Hospital, New York City
Attending Obstetrician, Lawrence Hospital, Bronxville, New York

Dr. Fred E. Clow, Wolfeboro, New Hampshire
Medical Director, Huggins Hospital

Dr. W. B. Coffey, San Francisco, California
Chief Surgeon, Southern Pacific Hospital, San Francisco; Surgeon to St. Francis' Hospital

Hon. Bird S. Coler, New York City
Commissioner of Public Welfare, New York City

Dr. William B. Coley, New York City
Professor of Clinical Cancer Research Cornell University Medical School; Attending Surgeon, Memorial Hospital

Dr. Mary M. Crawford, New York City
Attending Physician, Booth Memorial Hospital, New York City
Medical Director, Federal Reserve Bank

Dr. Andre Crotti, Columbus, Ohio
Surgeon-in-Chief, White Cross Hospital; Chief of Columbus Free Cancer Clinic

Dr. Bowman Crowell, Chicago
Associate Director, American College of Surgeons, Chicago
Director of Clinical Research, American College of Surgeons

Dr. S. J. Crumbine, New York City
Managing Director, American Child Health Association

Dr. William E. Deeks, New York City
General Manager, Medical Department of United Fruit Company

Dr. R. S. Dinsmore, Cleveland, Ohio
Surgical Staff, Cleveland Clinic

Dr Louis I. Dublin, New York City
Statistician, Metropolitan Life Insurance Company

Dr. Herbert DuCret, Brooklyn, New York
Visiting Surgeon, Cumberland Hospital; Assistant Visiting Surgeon, Peck Memorial Hospital

Dr. Edwin C. Ernst, St. Louis, Missouri
Radiologist, Barnard Free Skin and Cancer Hospital, St. Louis
President-Elect, Radiologic Society of North America

Dr. James Ewing, New York City
Professor of Pathology, Cornell University Medical School
Director of Memorial Hospital

Dr. K. George Falk, New York City
Director of Harriman Research Laboratory, Roosevelt Hospital

Dr. Louis H. Fligman, Helena, Montana
Attending Internist, St. Peter's Hospital, St. John's Hospital, and United States Veterans' Bureau

Dr. F. E. Gendreau, Montreal, Quebec
Professor of Radiology, University of Montreal; Director of the Radium Institute and Cancer Institute of the University of Montreal

Dr. William P. Graves, Boston, Massachusetts
Professor of Gynecology, Harvard University Medical School
Surgeon-in-Chief, Free Hospital for Women, Brookline, Massachusetts

Dr. D. Crosby Greene, Boston, Massachusetts
Laryngologist, Massachusetts General Hospital, Boston
Surgeon, Boston Children's Hospital

Dr. Robert B. Greenough, Boston, Massachusetts
Assistant Professor of Surgery, Harvard University; Director of Huntington Memorial Hospital

Dr. Charles J. Hastings, Toronto, Canada
Medical Officer of Health, Toronto

Dr. William P. Healy, New York City
Attending Gynecologist, Memorial Hospital
Junior Gynecologist, Roosevelt Hospital

Dr. Lester Hollander, Pittsburgh, Pennsylvania
Medical Director, Pittsburgh Skin and Cancer Foundation

Dr. John S. Horsley, Richmond, Virginia
Surgeon-in-Charge, St. Elizabeth's Hospital, Richmond
President of Virginia State Medical Association

Dr. Otto V. Huffman, Mt. Kisco, New York
Consulting Physician, North Westchester Hospital

Dr. Ellis Kellert, Schenectady, New York
Director, Ellis Hospital Laboratory

Dr. Alson R. Kilgore, San Francisco, California
Assistant Visiting Surgeon, San Francisco Hospital
Instructor in Surgery, University of California Medical School

Dr. Edward B. Krumbhaar, Philadelphia, Pennsylvania
Director of Laboratories, Philadelphia General Hospital

Dr. Everett S. Lain, Oklahoma City, Oklahoma
Professor of Dermatology and Radiotherapy, University of Oklahoma School of Medicine; Consultant Staff, St. Anthony's Hospital, Wesley Hospital and Oklahoma General Hospital

Mr. Curtis E. Lakeman, New York City
Assistant Director, Joint Committee on Methods of Preventing Delinquency

Dr. Heinz Langer, Pittsburgh, Pennsylvania
Director of Roentgenotherapy and Physiotherapy, The Western Pennsylvania Hospital

Dr. Burton J. Lee, New York City
Clinical Professor of Surgery, Cornell University Medical School
Attending Surgeon, Memorial Hospital

Dr. Maurice Lenz, New York City
Attending Radiotherapist, Montefiore Hospital; Associate Radiotherapist, Mount Sinai Hospital

Dr. I. D. Le Roy, Pleasant Valley, New York

Dr. Elise S. L'Esperance, New York City
Assistant Professor of Pathology, Cornell University Medical School
Serologist, Memorial Hospital

Dr. Isaac Levin, New York City
Director, New York City Cancer Institute
Professor of Cancer Research, New York University Medical School

Dr. Fielding O. Lewis, Philadelphia, Pennsylvania
Professor of Laryngology, Jefferson Medical College
Otolaryngologist to Radiological Department, Philadelphia General Hospital

Dr. Howard Lilienthal, New York City
Professor of Clinical Surgery, Cornell University Medical School
Consulting Surgeon, Mount Sinai and Bellevue Hospitals

Dr. Jennings C. Litzenberg, Minneapolis, Minnesota
Professor of Gynecology and Obstetrics, University of Minnesota

Mr. Victor Logan, New York City
Fourth Year Medical Student, Johns Hopkins University

Dr. H. L. Lombard, Boston, Massachusetts
Epidemiologist, Cancer Section, Massachusetts Department of Public Health

Dr. Le Roy Long, Oklahoma City, Oklahoma
Dean and Professor of Surgery, University of Oklahoma School of Medicine

Dr. William C. MacCarty, Rochester, Minnesota
Chief of Section of Bio-Pathology and Diagnosis, Mayo Clinic

Dr. Ward J. MacNeal, New York City
Director of Department of Laboratories, New York Post-Graduate Medical School and Hospital

Dr. Charles L. Martin, Dallas, Texas
Assistant Professor of Roentgenology, Baylor College

Dr. Ernst A. May, Newark, New Jersey
Director, Metcalf Institute for Radiotherapy, Orange, New Jersey
Attending Roentgenologist, Sea View Tuberculosis Hospital of the City of New York

Dr. Charles H. Mayo, Rochester, Minnesota
Professor of Surgery, University of Minnesota Medical School
Surgeon, St. Mary's Hospital and Mayo Clinic

Dr. P. E. McSweeney, Burlington, Vermont
Professor of Obstetrics and Gynecology, University of Vermont Medical School; Attending Surgeon, Mary Fletcher and DeGoesbriand Hospitals

Dr. Willy Meyer, New York City
Professor Emeritus of Surgery, New York Post-Graduate Medical School and Hospital; Consulting Surgeon, New York Skin and Cancer Hospital

Dr. Arthur H. Morse, New Haven, Connecticut
Obstetrician and Gynecologist-in-Chief, New Haven Hospital and Dispensary

Dr. James B. Murphy, New York City
Director of Department of Biophysics, Rockerfeller Institute for Medical Research

Dr. John J. Morton, Rochester, New York
Professor of Surgery, University of Rochester School of Medicine and Dentistry; Surgeon, Strong Memorial Hospital

Dr. William Neill, Jr., Baltimore, Maryland.
Associate Professor of Surgery, Howard A. Kelly Hospital

Dr. O. L. Norsworthy, Houston, Texas
Member of Committee on the Study of Cancer for the State Medical Association of Texas

Dr. Thomas Ordway, Albany, New York
Dean and Associate Professor of Medicine, Albany Medical School
Attending Physician, Albany Hospital

Dr. Anna C. Palmer, Milton, Massachusetts
Cancer and Narcotic Adviser to the Department of Public Health of the General Federation of Women's Clubs

Dr. James T. Pilcher, Brooklyn, New York
Attending Surgeon, Brooklyn State and Unity Hospitals
Visiting Surgeon, Peck Memorial, Eastern Long Island, and St. Bartholomew's Hospitals

Dr. Alexander Primrose, Toronto, Canada
Professor of Clinical Surgery, Toronto University Medical School
Surgeon to Toronto General Hospital

Dr. Douglas Quick, New York City
Attending Surgeon, Memorial Hospital

Dr. C. I. Redfield, Middletown, New York
Surgeon to Thrall Hospital, Middletown; Consulting Surgeon, Middletown Sanitarium

Dr. Harry C. Saltzstein, Detroit, Michigan
Director of Cancer Clinic, Harper Hospital

Dr. John A. Sampson, Albany, New York
Professor of Gynecology, Albany Medical College

Dr. Joseph W. Schereschewsky, Boston, Massachusetts
Assistant Surgeon-General, United States Public Health Service
Surgeon-in-Charge of Field Investigations of Cancer

Dr. George H. Semken, New York City
Attending Surgeon, New York Skin and Cancer Hospital
Consulting Surgeon, Institute of Cancer Research, Columbia University

Dr. Burton T. Simpson, Buffalo, New York
Director, New York State Institute for the Study of Malignant Diseases

Miss Maud Slye, Chicago
Assistant Professor of Pathology, University of Chicago Medical School
Fellow of Sprague Memorial Institute for Medical Research

Dr. Erwin F. Smith, Washington, D. C.
Pathologist-in-Charge, Laboratory of Plant Pathology, United States Department of Agriculture

Dr. G. M. Smith, Waterbury, Connecticut
Visiting Surgeon to Waterbury Hospital

Dr. Richard R. Smith, Grand Rapids, Michigan.
Surgeon to Grand Rapids Clinic

Dr. George A. Soper, New York City
Managing Director, American Society for the Control of Cancer

Dr. Rollin H. Stevens, Detroit, Michigan
Dermatologist and Roentgenologist, Grace Hospital
Associate Professor of Dermatology and Assistant Professor of Roentgenology, Detroit College of Medicine

Dr. William S. Stone, New York City
Clinical Director, Memorial Hospital

Dr A. C. Strachauer, Minneapolis
Chief of Department of Surgery, and Director of Memorial Cancer Institute, University of Minnesota

Dr. Howard C. Taylor, New York City
Professor of Clinical Gynecology, College of Physicians and Surgeons, New York City
President, American Society for the Control of Cancer

Dr. Frederick J. Tees, Montreal, Canada
Associate Surgeon, Montreal General Hospital; Lecturer in Surgery, McGill University

Dr. Martin B. Tinker, Ithaca, New York
Visiting Surgeon to Ithaca General Hospital; formerly Assistant Professor of Surgery, Cornell University Medical School

Dr. Philemon E. Truesdale, Fall River, Massachusetts
Director of the Earle P. Charlton Surgery and Laboratories of Fall River

Dr. Shields Warren, Boston, Massachusetts
Pathologist, Palmer Memorial Hospital, Boston; Instructor in Pathology, Harvard University School of Medicine

Dr. J. E. Weeks, New York City
Consulting Surgeon, New York Eye and Ear Infirmary; Professor Emeritus, University and Bellevue Hospital School of Medicine

Dr. William H. Welch, Baltimore, Maryland
Director of the School of Hygiene and Public Health; Head of Department of Bacteriology and Immunology, Johns Hopkins University School of Medicine

Dr. J. Ralston Wells, Philadelphia, Pennsylvania
Professor of Surgery, Women's Medical College of Pennsylvania
Assistant Surgeon, Radiological Department, Philadelphia General Hospital
Instructor in Cancer Surgery, Postgraduate School of the University of Pennsylvania

Dr. John Roy Westaby, Madison, South Dakota
A Managing Director of the New Madison Hospital; Member of Surgical Staff

Dr. Otis B. Wight, Portland, Oregon
Assistant Professor of Gynecology, University of Oregon School of Medicine

Dr. William F. Wild, New York City
Field Representative, American Society for the Control of Cancer

Dr. William H. Woglom, New York City
Associate Professor of Cancer Research, Columbia University

Dr. Francis C. Wood, New York City
Professor of Clinical Pathology and Director of Institute of Cancer Research, Columbia University

The cost of publishing this Report is borne
by the Harry M. Lasker Memorial Fund

GENERAL ACCOUNT OF THE SYMPOSIUM

THE International Symposium on Cancer Control, held under the auspices of the American Society for the Control of Cancer at Lake Mohonk, New York, September 20 to 24, 1926, was for the purpose of considering the prevention and cure of cancer from a practical standpoint, and of expressing in concise language the fundamental groundwork of fact and opinion upon which the collective effort now being made in the United States and other countries for the control of cancer should be continued and extended.

It was believed that there were many things which physicians and surgeons could agree upon and that, if these agreements could be expressed in simple, concise language, the results would be of much value.

THE CALL FOR THE MEETING

The preliminary announcements and invitations were sent out in May, 1926, although the feasibility and desirability of presenting the Symposium had been discussed with many of those who were expected to attend more than a year before the meeting took place.

The notice calling for the meeting stated that the need of bringing about the Symposium had arisen from the seriousness of the cancer problem. According to statistics issued by the United States Census Bureau, 1 in every 10 adults now living in the United States is destined to die of cancer. Between the ages of 45 and 65, 1 in every 5 deaths among women is due to this disease. Cancer is now a greater menace to adult life than tuberculosis and its death rate is rapidly increasing.

Cancer is in many respects a unique disease. Against it no sanitary or public health measures have had any effect. It has not been affected by preventive measures such as have been employed against infectious diseases. The upbuilding of bodily health and the improvement of social and economic conditions are incapable of reducing its prevalence. There is no example of the successful control of any other disease which affords any prospect of success if employed in a campaign against cancer.

The only effective measures which offer any promise are personal ones. People must learn the symptoms and apply to competent physicians upon the first suspicion of the presence of cancer. On their part physicians must give prompt and skilful attention to the patients who come to them. Otherwise, practically every case must prove fatal.

It appears that the direction in which efforts can most hopefully be employed to cope with the scourge of cancer is through education. Apparently there should be: (1) a widespread campaign to teach the public what everyone should know about cancer; (2) a dissemination among the practitioners of medicine of information that would help them in diagnosing and treating the cases which come to them; (3) adequate hospital provision for the care of curable and incurable cancer patients; and (4) continued research into the cause, prevention, and cure of cancer.

The organized efforts made throughout the United States for the past 12 years, under the leadership of the American Society for the Control of Cancer, have been based upon these principles. There appears to be substantial agreement that they are the soundest which present scientific knowledge permits. Opinions differ, however, as to the detailed procedures which ought to be employed in carrying the principles into effect.

The announcement declared that the meeting was to discuss not only the principles but the most effective methods of applying them in a practical way. The experience gained in different countries would be reviewed. By bringing the best information and wisest judgment anywhere obtainable to bear upon this question, it was hoped that substantial improvements in the methods for the control of cancer could be accomplished.

THE MEETING PLACE

The meeting was held September 20 to 24, 1926, at the Lake Mohonk Mountain House, Lake Mohonk, Ulster County, New York. Mohonk is about 75 miles north of New York City. The place is well known for the many meetings on humanitarian and philanthropic subjects which have been held there. Among these were the Annual Conferences on the Indian and Other Dependent Peoples, begun in 1883, and the Conferences on International Arbitration, begun in 1895, with the object of perfecting the mechanism of arbitration and adapting it for the settlement of international differences. These annual meetings ceased at the time of the World War.

The hotel accommodates about 400 persons and is beautifully situated in the midst of an estate of over 6,000 acres, with about 70 miles of road and 25 miles of picturesque and rugged mountain trails.

The total number of persons officially present was 109; of these, 16 came from the principal countries of Europe. The names of all who were present will be found elsewhere in this account.

The Europeans were guests of the Society. They were met on the arrival of their ships and escorted to the Hotel Roosevelt in New York City, where they stayed until the morning of September 20. Through the courtesy of the United States Department of State the freedom of the port was extended to all the visitors.

Various hospitalities were offered by individuals and clubs in New York City. The Society entertained its guests at dinner on the evening of September 19, and assisted them in seeing the principal points of interest in and about New York City before and after their stay at Mohonk.

On the morning of September 20, the European guests with about an equal number of Americans, chiefly members of the Society's Executive Committee, were escorted to Mohonk. Through the courtesy of Mr. Vincent Astor, the yacht *Nourmahal* was used to go up the Hudson from New York City to Bear Mountain, a distance of 45 miles. Luncheon was served at Bear Mountain, after which the party was taken by automobiles, headed by New York State Police, to West Point. At West Point the cadets were paraded, through the courtesy of Major General Stuart, Commandant of the Post, Lieut. Colonel Hodges, in command of the Cadets; and Colonel Ashforth of the United States Medical Department. After the parade the journey was continued by motor to Mohonk.

The program of the Symposium included formal ceremonies on Monday evening followed by executive meetings on the morning and afternoon of Tuesday, Wednesday, and Thursday. There was a meeting open to all the guests of the hotel on Wednesday evening.

The two general meetings were presided over by Dr. Taylor, president of the American Society for the Control of Cancer. The executive sessions were under the chairmanship of two of the principal officers of the Society, Dr. Francis Carter Wood, vice-president, and Dr. Robert B. Greenough chairman of the Advisory Council.

At the beginning of the Symposium it was announced that a committee had been appointed consisting of Professors Hartmann, Deelman, Blumenthal, Handley, and Dr. Soper, to whom all resolutions or other action proposed to be taken in the name of the Symposium should be referred in advance of a general vote. Three propositions for formal action were brought up and referred to this committee, discussed by them, reported back and, after discussion by the whole Symposium, passed.

After the Symposium, the party returned to New York in a special car attached to a fast train on the New York Central Railroad. On Friday evening a dinner was held at the Hotel Astor in honor of the foreign guests at which 228 prominent physicians were present by invitation of the Society. This function concluded the official ceremonies connected with the Symposium.

OPEN SESSION

Monday Evening—8:oo O'Clock

The first meeting of the Symposium was open to all the guests of the hotel. There was an invocation by Dr. Edward Dwight Eaton, of Wellesley, Massachusetts, followed by addresses by Drs. Taylor, Soper, Welch, and Sir John Bland-Sutton.

THE MEETING CALLED TO ORDER

PRESIDENT HOWARD CANNING TAYLOR, M.D., New York City: There is no subject in the field of medicine that is more important to all of us than that of cancer. It is a subject about which a great deal is known. I don't know any subject in medicine about which so much is known that is not made use of.

Something over a year ago, it was decided to hold this Symposium and it was our intention to bring together the most eminent men who were working on the different phases of the cancer problem in all the countries in the world. I think we have succeeded in bringing together such a group of men, and on behalf of the American Society for the Control of Cancer I wish to welcome the men who have come from such a long distance to make this meeting a succeess.

The man who has been responsible for arranging this meeting is Dr. George A. Soper, and I will ask him to speak on the plan and scope of the meeting.

THE PURPOSE AND PLAN OF THE MEETING

By GEORGE A. SOPER, Ph.D., NEW YORK CITY

THIS meeting may be looked upon as affording an answer to the question: What is the world doing to control cancer?

There are here gathered together from the principal countries of the civilized globe persons of high standing in the professions of surgery, pathology, bacteriology, physiological chemistry, epidemiology, and radiology. There are educators and publicists. There are physicians who occupy professorial chairs in twenty universities. There are directors of institutes devoted exclusively to cancer research. And there are men and women who do not belong to any profession but whose hearts and minds have none the less been nobly dedicated to the relief of suffering and the prevention of death from this terrible malady.

The world does not contain higher medical authorities than are present at this meeting and it is not too much to say that a more distinguished group of students of the cancer problem has never been convened.

There is one element in the cancer problem which is not actively represented. It is a most important group but, through unavoidable circumstances, it could not be present. I speak of the general public.

The general public is not here to take the initiative in discussing anything at this meeting, but provision has been made whereby it will learn all that is going on and there is no doubt that there will be abundant discussion elsewhere.

The general public will learn through the newspapers the essential facts and in thousands of homes in this and other countries the news of the Mohonk Cancer Meeting will be a subject of vital interest.

HOW THE MEETING CAME TO BE HELD

You may be interested to know how the meeting came to be held. For thirteen years the American Society for the Control of Cancer has been carrying on a campaign of education throughout the United States and Canada designed to give the public and the medical profession the latest and most helpful facts which could be used to save lives and suffering from cancer. It has critically reviewed the work which it has done. It has carefully studied the methods and results of other organizations in the same field, wherever they were to be found. This led to the feeling that it would be mutually helpful if a better understanding could be had in every country of the work for the control of cancer in the others and it was thought that the best way to accomplish this mutual understanding was to bring together as many as possible of the principal workers in cancer control.

It was originally intended that the total number of persons present at the Symposium should be about fifty. It was to be an informal, confidential meeting such as might occur among doctors anywhere. The restrictions imposed upon a perfectly free expression of ideas by the parliamentary machinery necessarily employed for the orderly conduct of large conventions and congresses were to be avoided.

In the beginning there was no thought that a great deal of publicity would be attached to this meeting. The idea has grown. Now, the number of persons in attendance is fixed only by the capacity of the hotel.

The daily press has shown a lively interest in the occasion. Newspaper editors have said that if reporters were not admitted, they would feel compelled to take such other measures as might be open to them to get accounts of the proceedings—so great is the public interest in cancer and in this meeting at the present time.

It may be remarked in passing that there is not the slightest objection to the presence of reporters at the open sessions of the Symposium and that they will be given full information about the whole meeting, reliance being placed upon their intelligence, skill, and integrity to give the public a straightforward account. There is no medium of public education comparable with the daily paper and I can say on behalf of every person present at the Symposium that while nobody connected with it will seek to be quoted or to have his individual views promoted, there will be no attempt to conceal what is done, thought, or said on any topic which has to do with the prevention or cure of cancer.

And here, as elsewhere, it is well to make one point perfectly clear. It is not the knowledge or method of treatment exclusively held or practiced by one person, however eminent or successful he may be represented to be, upon which the public should put reliance, but upon that accumulation of fact and opinion which the foremost men in the profession possess. Men rise to eminence in the medical profession, as in pure science, by reason of intellectual fitness and character, as recognized by professional associates.

There have been other meetings, some of them international, on the subject of cancer. Some have been valuable, some have led to disappointment. Never before has a meeting of the scope and purpose of this one been held. For its object is not to announce discoveries, not to discuss ultrascientific points, not to debate tenuous theories nor to report unusual cases, but to take stock of the useful knowledge which exists concerning cancer and the practical ways in which this information can be turned to the greatest possible account. That there will be a certain amount of discussion of theory and opinion and that scientific refinements will enter into some of the arguments, is to be expected; but this is not the primary object of the gathering.

The meeting is intended to have a distinctly practical color. If the large, important facts about cancer and its proper treatment, and the sound working opinions upon which all well informed students of the subject can agree, can be formulated in such clear and simple language that everyone who reads can understand them, the public will be grateful and much needless suffering, not to say loss of life, will be prevented. The public sorely wants instruction and advice on the subject of cancer and, failing to get the genuine, it readily accepts the counterfeit. Ignorance, superstition and quackery nowhere cause greater misery. It is to be hoped that the meeting will produce some such statement.

STATUS OF THOSE PRESENT

It is to be noted that among those present there are few who come as delegates. Each has been invited in his individual capacity. He comes because of his personal distinction in some part of the field of cancer control.

Exception has been made in one particular. The American Society for the Control of Cancer was brought into existence by a number of organizations of surgeons and research workers, and it has been thought fitting that each of these founder societies should be invited to send delegates to represent it officially.

In another sense we may look upon all of those present as delegates, for they will faithfully report the things which are thought and done in the many countries and parts of the countries from which they come. They will say how their problems look from their points of view. They will describe details of their work which they would never think it worth while to put in print.

This interchange will be valuable to the extent that it is free and cordial. In spite of the familiar saying that "the world is very small," those who have traveled a good deal know that we live in a very large world, and that there are many ways of doing almost everything. So long as people speak different tongues they will think different thoughts and act in different ways. It is not only interesting, it is stimulating and instructive to observe these differences. It makes our tasks much easier.

Beyond this, the meeting is not to be looked upon as international. Rather, it has seemed desirable that it should be oblivious of all political, racial and sociological distinctions.

SCOPE OF TOPICS TO BE CONSIDERED

During the course of the meeting reports will be presented on practically every phase of the cancer problem. The prevention and cure of cancer will be discussed. The prevalence of the disease and the question whether cancer is increasing will receive consideration. The value of radium and X-rays and surgery as methods of treatment will be discussed. Histological and serological methods of diagnosis will be compared with other methods.

Of paramount importance will be the consideration given to the administrative procedures which should be employed in order that those who are in need of medical attention can get it in time. This is indicated by the titles of the reports which are listed on the program. Out of the 27 papers which will be read, 15 are upon the general topic of organized campaigns against cancer, 8 have to do with research, and only 4 with treatment.

ESSENTIALS OF THE FIGHT AGAINST CANCER

That civilization must wage a relentless war against cancer admits of no question. It is but too apparent to every intelligent person that the barriers which society has erected against this plague are inadequate. Think of it! According to our best statistics, more than 1 in 10 of all the deaths which occur among our men and women are due to cancer.

Among men between 55 and 70, at least 1 in 8 deaths is caused by cancer. Of all the women who die between 45 and 65, not less than 1 in 5 dies of cancer. The aggregate loss of life is appalling. Considering its continual prevalence and fatality, the world has never known such a plague. And the money which is being spent in order to understand the causation and to stop its fearful ravages is trifling.

More money is needed for laboratories, for hospitals, for research workers, and for the educational organizations which are striving to guide the thoughts and actions of the public aright on this difficult subject. More money is needed—a great deal more. The Symposium can scarcely fail to declare the need of a more vigorous, a more concerted warfare against cancer. The very fact that it is being held is a call to arms.

So far as can be seen at this time, the control of cancer is a problem which looks for solution to an informed medical profession, to an enlightened public, to the philanthropist of clear and generous vision, to the painstaking student, to the courageous patient. Much information is needed before the disease can be suppressed, but there is enough well established fact and sound working opinion in existence to save many lives. This is not a problem which can wait until we get a complete solution, if ever that can be found. We must make the most of what we have.

Inasmuch as no war can be waged successfully by individuals working independently, so the campaign against cancer calls for team play—team play, in fact, of a particularly high and effective type. To save lives from cancer requires the fullest possible use of the best skill which is obtainable. Cancer is not a disease to temporize with. Delay in obtaining proper treatment is not merely dangerous; it is usually fatal. In early and proper treatment lies the hope of cure.

The methods now employed in the treatment of cancer are in many respects the same in all countries, but the organized efforts which are being made to promote those procedures differ materially. Thus, one country is devoting itself chiefly to the promotion of research, while others are directing their forces to the practical application of the information which exists. Still other countries are combining, in definitely planned organized effort, research, the care of patients, and the instruction of students in a manner which seems admirably adapted to their local conditions.

A plan of campaign against cancer which is suitable for all countries has not yet been formulated. Perhaps in this meeting we could do a useful service to mankind by proposing one. It would help, even though it were but an outline. It ought to be of such a character as to permit of revision from time to time, as advancing knowledge and experience indicate.

WHAT MAY BE EXPECTED FROM THE MEETING

It is quite impossible, and it would be impertinent, to forecast the results of this meeting so brilliant in personnel, so bent on accomplishment, so inspiring in its purpose of practical good.

But it is permissible to say beforehand that whatever may be said or done in regard to the scientific, educational, and administrative questions which will be discussed, one great and encouraging result is certain to be accomplished. A forward step in cancer control will be taken by reason of the personal contacts which will be made. Those who have attended the Symposium will know one another better than they did before. The very meeting of these gifted men and women, animated by so unselfish a purpose, forming and cementing cordial relationships, freely exchanging informal expressions of opinion, hazarding, when the occasion suits, an hypothesis or surmise or suggestion which the formal restraints of custom would never permit them to record upon paper, is a result of the very greatest value.

It is believed that no better setting for our meeting could have been provided than is afforded by the beautiful environment of mountain and lake in which it is to take place. The Mohonk tradition is one not only of generous hospitality but of intellectual, moral, and philanthropic purpose. Here for many years were held the Indian conferences, which brought men and women together from all parts of the North American continent to consider the welfare of the vanishing aborigines. Here, also, were held the annual meetings for the discussion of a basis for agreement to insure international peace.

Is it not possible that from this meeting which has been called to consider the practical aspects of cancer control there may come other meetings, if not at Mohonk, then at other appropriate and agreeable places, so that periodic gatherings of students of cancer control may become a feature of the world's effort to combat this greatest of human plagues? It may be that an international organization for the control of cancer, composed of the many institutes, leagues, and societies which exist in different parts of the world to advance the knowledge of this subject and promote the practical application of the information which exists, should be established.

THE PLAN OF THE MEETING

A few words should be said concerning the machinery of the Symposium. Each morning from 9:30 to 12:30 there will be a meeting in executive session in this room. Only those who have been invited to attend the Symposium will be present. The formal papers which have been prepared in advance will be read and discussed. Expert stenographic reporters will record what is said in the discussion of these papers, so that no remark of value will be lost.

The afternoons will also be devoted to the reading of papers. As in the morning meetings, attendance at the afternoon sessions will be confined to those who have been invited to take part. A full attendance is expected at each meeting. There will be no sections or other divisions to prevent each person from hearing every paper.

There is a General Committee before whom all resolutions are to be laid in writing before any action is taken upon them in the name of the Symposium.

Resolutions must be filed with this Committee at least 24 hours before action is taken on them by the Symposium as a body. The Committee is composed of the following: Deelman, Hartmann, Blumenthal, Handley, and Soper.

The executive sessions will be called to order by Dr. Wood, vice-president of the American Society for the Control of Cancer, or Dr. Greenough, chairman of the Advisory Council of the Society.

The language of the meeting will be English for the reason that so few Americans speak any other tongue. If, however, anyone wishes to address the meeting in another language, his remarks will be translated into English as he proceeds, through the medium of interpreters who have kindly offered their services. Expert medical reporters have been supplied to record what is said. On being called upon to read their papers, Europeans who speak English with difficulty may personally give summaries of their papers in their own language, after which translations of the full text will be read in English. In accordance with a request by the management, all papers have been submitted in advance of the meeting, translated into English when necessary, and the translation submitted to the author for approval.

Twice a day, immediately after the executive sessions, I will meet the reporters and give them access to copies of the papers and supply them with details and other news of the meeting. I shall always and at all times be accessible to all the members of the Symposium.

It is expected that all the papers and discussions brought out at the Symposium will be printed in the form of a volume which will be issued and widely distributed as soon as the editorial and publishing work can be completed. This volume will be sent to public libraries, medical libraries, and public health authorities. If sufficient funds are available, it will be given a still wider circulation.

GREETING OF THE FOREIGN GUESTS ON BEHALF OF THE AMERICAN MEDICAL PROFESSION

By WILLIAM H. WELCH, M.D., Baltimore, Maryland

IT is a very honorable function that has been assigned to me, of saying a word of welcome and greeting to our foreign guests. By their presence here, they have increased the debt which American medicine already owes their respective countries.

It is only in comparatively recent years that we can say that our medicine has become independent. It is English in its origin, and was derived in the first instance in our colonial days from the country of the one who is to reply to what I have to say. It was Scotch medicine, to start with; but Scotch medicine came from a country which is also represented here—Holland, in fact, Leyden. The art of medicine came to Leyden from Italy in the sixteenth century. Italy, Holland, and Scotland were therefore our ancestors.

The more distinctive Scottish period was followed by the English, and that characterized the last two or three decades of the last century—the period of John Hunter, Astley Cooper, and Abernethy. But nothing has been more stimulating in the history of medicine than the influence which came from France in the eighteenth century and continued for a generation. When we speak of that and of those who were particularly active in spreading the new medicine, we speak of them as pupils; as Osler has spoken of the pupils of Louis, who introduced the methods of clinical diagnosis in such a wonderful way. In the late sixties, the great fertilizing influence was undoubtedly from Germany. Up to the period of the late war, I think it may be safe to say that the greatest and strongest influence was from Germany. We owe, therefore, a great debt to the various countries whose representatives honor us by their presence here.

But there always has been, even from colonial days, something of independence in American medicine—something characteristically American. We are now beginning to repay something of the debt which we owe to those countries by making our own contributions to the science and art of medicine. So that it is a source of very great gratification that we can invite our distinguished colleagues from other countries to come here that we may impart something, even if they give us much more than we can give to them.

The particular subject that brings us here, the control of cancer, is a subject of first importance. The decrease in the general mortality of our population is very great but cancer mortality is increasing. It has been said that the cancer rate of a country is the best index of its healthfulness, the meaning being that the healthier it is the larger is the number of persons who survive to the ages at which cancer is most prevalent.

In the organized effort which is being made to stop its ravages, cancer has fallen in line with other diseases of mankind. Let us pause for a moment to consider what are the diseases which organizations have been formed to combat: first, tuberculosis, then infant mortality, then cardiac diseases. One characteristic of them all is that in none do we possess a single specific method of prevention. Had we some procedure in tuberculosis which would be a sure cure, I venture to say that there never would have been any anti-tuberculosis crusade. As in tuberculosis, so in cancer, we have a measure of knowledge, imperfect though it is, which we believe, if better applied, would be of great benefit to mankind.

Another point has also interested me: the incidental by-products of the crusades against diseases. Take tuberculosis, for instance. Even if you could not prove that you had saved a single life by educating people concerning the disease, it would still have to be admitted that a great benefit to health had resulted from the tuberculosis crusades. It was through these that the general public first became interested in the prevalence of and economic loss from various diseases. It has been one of the very greatest benefits of anti-tuberculosis work that public health nursing has come to be developed. But, above all, the organized effort against tuberculosis has spread the gospel of open air life. And so the very great reduction which has taken place in the death rate is due very much to this popular anti-tuberculosis crusade. In the same general direction is the organized movement against infant mortality and the new movement in relation to cardiac diseases.

I venture to say that the organized effort for the control of cancer is also of far-reaching significance. We can already see certain effects of it. One, I think, is this. It has greatly stimulated co-ordinated study of the disease. Formerly, the pathologist, the surgeon, and the statistician were working independently along their own lines; they have now come together to a very great extent as the result of this cancer control movement, and this is what is needed for the elucidation of many difficult problems in cancer. Many combined attacks on the cancer problem are now being made by pathologists, parasitologists, medical men, and surgeons. That, in my judgment, is one of the great benefits.

It is also one of the great benefits of this movement that it has intensified the interest of medical men and the general public in the early diagnosis of cancer. Diagnosis can now be made much earlier than formerly. Early diagnosis is a cornerstone of the movement for cancer control as we know it today.

I might go on to indicate other directions which quite independently have a direct influence on the control of cancer, and which I believe to be very significant to public health and the progress of medicine in general.

Simple as the program of the Cancer Control Society is, the practical difficulties which will be presented in getting the lesson over are of course considerable. I think the incentive to the movement came from the surgeons. Every surgeon sees patients who have come to him too late—hopeless; and he knows that if he had only seen them 6 months before, they probably could have been saved. There is already sufficient knowledge, based, I think, not upon mortality statistics in general, but on the individual experience of surgeons, to show the reasonableness of the path that the American Society for the Control of Cancer is following. I am sure, as a pathologist, that the whole pathology of cancer is greatly influenced by this early diagnosis and treatment.

I suppose that if I were following out the tradition of what the foreigners think characteristic of Americans, I would tell of all the wonderful discoveries that Americans have made in the field of medicine. I could point out a few, but do not think it is becoming. One, however, which I do not think is yet fully utilized in the investigation of the causation of cancer is the cultivation *in vitro* of cells of tumors. I do not think the possibilities there have been fully utilized.

In a word, then, I am sure I speak on behalf of every one of my colleagues in this room, in expressing very great appreciation that so many of you who are so greatly interested in the study of cancer and are recognized authorities in the cancer field have come here.

The significance of this meeting from the international standpoint is almost too obvious to dwell upon. We know that nothing will draw countries together as will the discussion of a question which knows no political or geographic boundary. We have in cancer such a question and one of the very greatest importance to mankind.

RESPONSE ON BEHALF OF THE FOREIGN GUESTS

By SIR JOHN BLAND-SUTTON, London, England

IT is a pleasure as well as a responsibility to reply to the kind expressions which have been uttered by Professor Welch in regard to the foreign guests.

It is a pleasure to us to meet our *confrères* from European countries as well as to renew acquaintance with our American friends, all of them keen on cancer control.

The kindness, hospitality, and the warm welcome we have received touches the hearts of your guests. I congratulate Dr. Soper on his skill and diplomacy in collecting from the countries north of the Tropic of Cancer such a number of distinguished men to take part in the Symposium.

I have been asked to make some observations on the object of our meeting. I may remind you that there is a natural history of disease as well as of plants and animals. It is well known that weeds, if neglected, will suppress what we regard as nobler plants, and we have to realize that just as one species tramples out another, so one disease will usurp another. In the thirteenth century leprosy was as common in England as tuberculosis is today and then it disappeared.

In my early days as surgeon I had the advantage of knowing Sir James Paget; he was in his day the greatest authority on tumors, and a very philosophical man. Forty years ago he told me he was convinced that everyone would die of cancer if he or she lived long enough!

When it was suggested that an educational campaign for the control of cancer should be started in England it was thought unwise to tell the public that so many persons died of cancer lest the knowledge should cause a panic. However, that result did not follow, for every intelligent person is becoming deeply interested in the question.

Surgeons who are connected with cancer societies are bombarded with letters —long letters—from lay persons, containing suggestions for the cure of cancer which God has revealed to them in dreams! Some of the things recommended are as curious as the ingredients in the stew made by the witches in the famous caldron scene in *Macbeth.* You will remember that among other curious ingredients there were—

> Eye of newt and toe of frog,
> Wool of bat and tongue of dog,
> Adder's fork and blind worm's sting,
> Lizard's leg and owlet's wing.

Shakespeare did not invent this prescription. These things, and worse, were recommended in Nicholas Culpeper's book of medical remedies which was popular in the seventeenth century.

The question has often arisen: Is it wise to tell patients that they have cancer? Some insist upon knowing. There are many intelligent patients quite as capable of making a deduction from observed facts as the doctor himself.

The first patient on whom I operated was a good example. A fat woman weighing 200 pounds had a husband nearly as heavy. They were both fond of a little terrier weighing 10 pounds. A tumor grew on the dog's flank, bigger and bigger until it was nearly as big as the dog's body. When the terrier died the wife said to her husband: "James, I have a tumor on my side just like our dear little dog, and if it grows at the same rate as the tumor on the dog, what a dreadful sight I shall be!"

The next day she came to me and I removed a cancerous tumor, and she survived the operation many years.

When I came up the mountain this afternoon and looked into this lovely valley and saw Lake Mohonk glistening at the bottom, it brought to my mind the Sea of Galilee and the surrounding mountains where the author of the Sermon on the Mount delivered those famous Beautitudes which have been such a source of comfort to many in tribulation of mind as well as of body. It is my earnest wish that if our Symposium leads to no great discovery, it will at least send out to mankind at large a message of hope.

EXECUTIVE SESSIONS

Tuesday, Wednesday, Thursday and Friday, September 21–24.

THE VALUE OF CO-ORDINATED EFFORT AMONG SURGEONS, PATHOLOGISTS, AND OTHERS IN THE CONTROL OF CANCER

By Sir JOHN BLAND-SUTTON, Bt., London, England
Vice-Chairman, British Empire Cancer Campaign; President, Royal College of Surgeons

NEVER in the history of medicine have the methods of observation and experiment been co-ordinated and brought to bear in such strength for the control of a particular disease as in the quest for the cause or causes of cancer. This quest arose in consequence of the enormous impetus given to surgery by the discovery of anæsthesia and antisepsis which enabled surgeons to control pain and postoperative sepsis.

From time to time some apparently common things on the earth assume an importance unsuspected by ordinary mortals! This happened when yeast, the cause of vinous fermentation, was discovered to be a plant—a fungus. Pasteur investigated the nature of fermentation and Lister applied these discoveries to the control of suppuration.

Then men realized that such apparently dissimilar processes as fermentation, putrefaction, and suppuration are due to the activity of minute living organisms. When antiseptic methods were applied by surgeons in dealing with malignant diseases, the immediate effects were excellent, but the ultimate results were disappointing. Surgeons, baffled in their efforts to conquer cancer, appealed to the laboratories of pathology, bacteriology, biochemistry, and physics for enlightenment and guidance.

The later phases of the quest are associated with the search for the cause of cancer. This is undertaken by bacteriologists and biologists. The bacteriologists study minute forms of vegetable and animal life; biologists study not only the minute forms of life which may be the actual cause of diseases, but also those creatures which may be carriers—vectors—of the minute disease-provoking parasites.

Biological laboratories have an interest in research in relation to embryology which is concerned with the beginnings of life, and also study living tissue apart from the living body. This fascinating study is known as tissue culture. It must be remembered that Metschnikoff, who discovered the remarkable defensive powers of leucocytes against bacteria, was a biologist.

THE MICROSCOPE

The microscope is indispensable in the investigation of cancer. Man would know very little about his surroundings without the aid of optical glass. Naked-eye astronomy and naked-eye anatomy had reached finality before the invention of the telescope and the microscope. One of these instruments enabled the astronomer to discover new planets, satellites and comets, as well as to enlarge his conception of the universe. The microscope revealed a new world to the biologist and incidentally to medicine. Every increase in the power of these instrumental aids to vision brings new discoveries and illimitable problems. The circulation of the blood was accepted before the microscope revealed the capillaries which link up the arterial and venous systems. Today we speak of the corpuscular elements of the blood with the same familiarity with which we talk of acorns and chestnuts. The discovery of the circulation of the blood was a great achievement, but the detection of the lymphatic circulation was second only in importance, and especially in relation to cancer, for lymphatics are the subtle channels by which this disease is mainly distributed throughout the body.

The microscope gives pathologists the power to investigate the minute structure of tumors and enables them to distinguish the innocent from the malignant varieties, and to identify those which are cancerous.

Before surgeons used the microscope in the study of morbid growths, they were more interested in a tumor as big as a pumpkin than in one the size of a cherry. The big tumor could be borne for many years with no ill effect except inconvenience. The small one might destroy the patient's life in a year!

During the past 30 years much has been discovered in regard to the nature of tumors. The recognition of innocence in one, and the deadly nature of another, has required years of observation and experience. Many patients have been frightened out of their wits by opinions of malignancy based on naked-eye observation—but have lived to mock at their advisers!

The only reliable test of the nature of a tumor is a microscopic examination by an expert. One hundred years ago the microscope distorted as much as it magnified, and we have to realize that one tumor differeth from another tumor in malignancy as much as one star differeth from another star in glory. Today a properly equipped pathological laboratory is as necessary in a hospital as the operating room.

BACTERIOLOGY

Bacteriologists have revealed to surgeons important facts in what may be called the natural history of cancer.

When this disease arises in situations not easily accessible to microbes it is a chronic disease and may not destroy the patient's life for 20 years. Cancer in protected situations often grows silently, unsuspected; but when it arises in situations easily accessible to putrefactive bacteria, for example in the mouth or alimentary canal, the primary lesion is soon colonized by bacteria. Sloughing, pus production, and abscess are inevitable. Such sequences soon manifest themselves and may speedily destroy the patient.

The virulence of cancer, as a rule, depends on its septicity. In searching for the cause of cancer the bacteriologist is ever on the watch to avoid mistaking accidental bacterial invasions by common agents of sepsis for the causative agents of cancer. Neglect of this precaution has misled many observers. Putrefactive microbes are the common cause of failure in attempts to relieve cancerous patients by gross surgical measures.

BIOCHEMISTRY

Biochemistry is involved twofold in the control of cancer. While bacteriologists and biologists are searching for the cause of cancer, the biochemists provide agents for the control of sepsis—antiseptics—and for the cure of cancer without resorting to surgery. The excellent results which have been produced by chemotherapy indicate that the day may come when "it will be possible to introduce into the economy a molecular mechanism which, like a cunningly contrived torpedo, shall find its way to some particular group of living elements and cause an explosion among them, leaving the rest untouched." All this seemed fantastic when Huxley suggested it in 1881. Ehrlich discovered some subtle compounds, and there is something alluring in the idea of submitting morbid growths to a bacteriologic siege.

The idea of setting a thief to catch a thief is well shown in the modern treatment of infections of known origin. Minute agents of diseases introduced locally by the prick of a thorn, a pin, or splinter are conveyed through the natural gates and alleys of the body by the blood. Some are carried passively in the liquor sanguinis; others disport themselves in the stream, like small creatures in a brook; a few ensconce themselves in the blood corpuscles!

To meet these evils therapeutic agents can be instilled into the blood and thus irrigate the soiled areas of the living body. The therapeutic agents must be something which will destroy particulate causes of disease without poisoning the patient or disintegrating the red corpuscles. The treatment by serum, vaccines, and toxins belongs to this important department.

Before all things, surgeons long for some discovery which will enable them to cure cancer by some cunning drug introduced into the circulation and thus abolish a long series of distressing operations.

For the control of cancer it is necessary to educate men and women to the importance of seeking prompt advice for nodules, birth-marks, warts, moles, and chronic ulcers. All these apparently simple things are as obvious to the untrained eye as the moon and stars. The significance of such defects is known to well-trained surgeons and their removal is, as a rule, simple and safe. The naked-eye characters as to innocency or malignancy are often trustworthy, but it is wise to submit the least suspicious nodule to a microscopic examination and the eye of an expert. This is not difficult in great cities.

A properly equipped pathologic laboratory should be in close association with a general hospital. Clinical observation and research must go hand in hand. Biochemical laboratories are necessary not only for the discovery of therapeutic agents, but also to test their value in the cure of cancer.

In the domain of physics, X-rays without, and incandescent lamps within, render the body transparent for diagnosis and treatment.

STATISTICS

The employment of figures—statistics—comes into every concern of life. Bills of Mortality compiled by competent persons and used by men of experience are of great value, and should be regarded as information available for the purposes of investigation. They are of daily use in surgery. In controversy, statistics may be regarded as political arithmetic; they must be used with caution in relation to computations concerned with the increase of cancer.

The term "cancer" has an elastic meaning; to experts it is as circumscribed in its application as the term "constellation" to an astronomer; for non-experts it is as diffuse as the Milky Way, and as baffling as a fog.

It is amazing that tumors—things obvious to the meanest mind—have been the subject of so much observation, analysis, and comparison, from surgeons, physicians, and pathologists, yet their causes remain obscure.

We need not be pessimistic. Seventy years ago the cause of sepsis was as obscure as the cause of cancer is today. Science is the name of co-ordinated knowledge, and men have discovered after incredible labor that diseases are governed and spread by Nature's methods. We may feel sure that with the excellent co-ordination and co-operation of science and practice in the great cities of the world, aided by public interest and freely helped by enlightened benevolence, light will come.

Simon Newcomb, the American astronomer, the greatest master of mathematical astronomy of his time, pointed out that our knowledge of the movements of the planets has been acquired by the enormous labors of many astronomers and mathematicians. The cost of the maintenance of the observatories of the world is also enormous, and the failure to obtain full advantage of such labor and expenditure is due to lack of co-operation among the various countries.

The cancer quest is of equal importance with planetary motion, and it demands concerted action among workers in all countries.

This Symposium will lead to good consequences. There must be concerted action among the cancer research societies. Each to a large extent works in its own way and along independent lines. Co-ordination is of the greatest value in fighting a common foe.

The independent worker must not be forgotten. Many have felt the lack of a laboratory in their early days. In the pathologic laboratory at the Middlesex Hospital, rooms are set apart and facilities given to anyone who can show good cause for his ideas and methods. He is then allowed to work on his own lines. The cause or causes of cancer may be discovered by an independent quester unfettered by routine and prompted by originality. He should be adequately rewarded and allowed to pursue his quest unhampered by domestic needs.

The British Empire Campaign has adopted, at the suggestion of Lady Cave, this motto: *Quod refert quis opus faciat modo denique fiat?* (What does it matter who does the work so long as the work is done?)

CANCER EDUCATION IN ENGLAND

By W. SAMPSON HANDLEY, F.R.C.S., London, England
Professor of Surgery and Pathology, Royal College of Surgeons of England; Surgeon, Middlesex Hospital

THE history of cancer control in England, as might be expected, is one of slow, irregular, and perhaps stunted growth from small beginnings.

A certain Mr. Howard, surgeon to the Middlesex Hospital, London, at the end of the eighteenth century, published a plan for the relief of sufferers from cancer, which included in its scope the providing of special cancer wards and the keeping of cancer records. Inspired by Howard, W. Samuel Whitbread left to the Middlesex Hospital a considerable sum of money to establish within the Hospital special wards for cancer, where the sufferers could remain until "relieved by art or released by death." These wards were opened in 1792.

In 1905, by the action of the Barnato-Joel trustees, further wards were opened, a special operating theater erected, and a block of research laboratories was built. From this date the Cancer Charity of the Middlesex Hospital has become a complete special hospital for cancer. From 1902 until the outbreak of the war at least one number per annum of the *Archives of the Middlesex Hospital*, edited by Professor Lazarus-Barlow, was devoted to the results of cancer research work. I would like to draw attention to the importance, as a stimulant to research, of an institutional periodical appearing at regular intervals.

In 1913 the Middlesex Hospital took another pioneer step. Radiation was becoming increasingly important in treatment, and accordingly, the post of physicist to the Hospital was created. This appointment, now an endowed professorship, is held by Professor Charles Russ, D.Sc., whose co-operation with the medical members of the staff of the Hospital has proved invaluable in the departments of radium and X-ray treatment.

An alteration has lately been made in the organization of cancer research. This was formerly under a director who controlled the activities of all the workers in the laboratories. Of late years, however, the Middlesex Hospital School has become a branch of the University of London, staffed, as regards the principal scientific subjects, physics, chemistry, physiology, anatomy, and biochemistry, by whole-time university professors. Cancer research in its different branches is pursued independently in each professional department, and coordination is attained by a hospital research committee of which all the professors are members under a lay chairman. It is thought that this system, which is still on trial, will insure a wider outlook on cancer research by bringing it into touch with pure science and with other medical research.

THE CANCER HOSPITAL

The only other complete cancer institution at present in England is the Cancer Hospital (Fulham Road, London S.W.). This hospital, though of recent origin (founded in 1851), has of late years grown rapidly in size and importance and has completed its organization by the addition of first-class research laboratories under the able direction of Dr. Archibald Leitch. As Dr. Leitch is present I ask you to refer to him for further information.

A cancer hospital also exists at Manchester, and it seems likely that here and also at Birmingham complete cancer institutes in connection with the local university will shortly arise.

At Leeds, hitherto without a cancer hospital, events have moved rapidly during the past year. Under the ægis of the British Empire Cancer Campaign and the chairmanship of Lord Lascelles a meeting of a few hundred of the most prominent and influential inhabitants of the west of Yorkshire was arranged with the object of establishing a cancer center at Leeds. Sir Berkeley Moynihan, who spoke, began his speech by saying that about 60 of the people in the room were destined to die of cancer. The University of Leeds promised the assistance of its professional and laboratory staff to the Institute, which will be closely affiliated with the University. At the end of the meeting subscriptions amounting to £100,000, now increased to £120,000, were announced.

Thus, as the result of this one meeting, no doubt preceded by much quiet organizing work, an efficient center for research and treatment in Leeds is assured. No better example of the importance of instructed public opinion could be produced.

NEWTON ABBOT HOSPITAL

Leeds is a rich city, but even in a small community if a leader arises much can be done. At the town of Newton Abbot in Devonshire, a small place of perhaps 20,000 inhabitants, thanks to the initiative of Dr. Edgar Haydon, special cancer wards have been established in connection with the local hospital, particularly for radium treatment. Newton Abbot can claim that in proportion to its size it possesses more radium than any other town in England.

HOSPITAL SOIRÉES

For several years past the Middlesex Hospital has given to its supporters in all ranks of life, and especially to the employees of the great West End of London firms who have been active on its behalf, a series of simple evening entertainments in which the professors and medical staff, by actual demonstration in the laboratories with the microscope, the X-ray machine, the radium tube, the ultraviolet lamp, etc., have introduced the laity to some of the wonders of medical science.

Thus the Hospital is presented to the public not merely as a place for healing the sick but in its even more important function as the source and fount of medical knowledge where vague ideas, such as ideas concerning a microbe, are translated for the public into terms of vision and actual knowledge.

These entertainments, initiated by Mr. Walter Kewley, our House Governor, have excited great interest and appreciation.

STATE AND PUBLIC HEALTH ACTIVITIES

In England the government has been slow to take any direct share in cancer control. The matter until a few years ago was left to voluntary or individual effort. This policy was first modified about 1915, when the Medical Research Council, an entirely Governmental organization, financed from national funds, was first established to take care of medical research. Its foundation was a logical sequel of the national system of health insurance and it has done a great work. Its secretary is Sir Walter Fletcher. The danger that such a powerful Governmental machine might benumb the individual initiative which is the life of research has so far been avoided. The recent work of Gye and Barnard, which has excited so much discussion, came from the research laboratories of the Medical Research Council.

The Medical Research Council is a committee of the King's Privy Council, presided over by the Earl of Balfour, and is independent of the Ministry of Health. Last year it received a Governmental grant of £135,000.

The Ministry of Health about the year 1922 established a Departmental Committee on Cancer which has concerned itself chiefly with the statistical and epidemiological study of cancer, more especially as affecting the breast. This committee has prepared memoranda on various public health aspects of the disease and has circulated them to the local health authorities. The leaflets are written for the intelligent layman as much as for doctors. The Ministry has inspired the formation of local cancer committees in the large towns, and has encouraged medical officers of health to carry out field inquiries on cancer in their districts. A committee so formed in Manchester has expanded considerably and is endeavoring to secure collaboration between the various hospitals and institutions interested in cancer and to amalgamate funds, hitherto separately administered. By means of such co-ordinated inquiries the Ministry hopes to get in time a fair sample of certain conditions related to cancer throughout the country. The secretary of the Departmental Committee is Lieut. Col. A. B. Smallman.

THE FINANCING OF RESEARCH AND EDUCATION

In England an unofficial body whose main object is the collection of funds for the general support and co-ordination of cancer research and education was brought into existence in 1923 under the name of the British Empire Cancer

Campaign. This body in its early days made its appeal with the assistance of the British Red Cross Society and through the machinery of that body. It is now separately organized but retains its parallelism with the Red Cross Society in that its collecting machinery is being organized on a territorial or county basis with the Lord-Lieutenant of each county as the chairman of a local committee of the Campaign. The headquarters organization in London includes under the presidency a controlling council, containing representatives of the different cancer hospitals and research laboratories, a scientific committee partly appointed by the Governmental departments of health and medical research, which considers applications for assistance from institutions and individuals, a finance committee, and an appeal committee. Active county committees enjoy a considerable degree of autonomy in the disposal of the funds they collect.

The British Empire Cancer Campaign has made tentative beginnings in the matter of education of the public in the early signs of cancer, by lectures and literature, but hitherto most of its effort has been directed to the financing and co-ordination of cancer research.

Upon the initiative of the late Sir William Leishman, the Campaign has lately begun the publication of *The Cancer Review*, a monthly journal of abstracts and reviews intended for the assistance of research workers.

The organization of the Campaign illustrates the general tendency in England to approach cancer education from above downward, and to approach very cautiously the instruction of the uneducated public. The organizing adviser, Sir John Goodwin, late director general of the Army Medical Service, does, however, combine his appeals for funds with elementary instruction about the disease.

IMPERIAL CANCER RESEARCH FUND

This Fund, dating from about 1900, is under the joint management of the Royal Colleges of Physicians and Surgeons. Its endowment, with some aid from yearly subscriptions, is devoted mainly to the maintenance of a research laboratory under the direction of Dr. J. A. Murray. The Fund has done great work in the department of experimental cancer in animals, and is at present undertaking the important task of repeating and controlling the experiments of Gye and Barnard, a task for which its independent position particularly fits it.

EDUCATION BY LITERATURE

The earliest literary advocate of cancer control in England was the late Mr. Charles P. Childe, surgeon to the Royal Portsmouth Hospital, whose recent death was a great loss to the medical profession and the nation.

As far back as 1906 Mr. Childe published his book *The Control of a Scourge, or How Cancer is Curable*. Last year Mr. Childe rewrote this work under the title *Cancer and the Public*. The book is addressed to the educated layman even more than to the doctor. It points out the appalling ignorance of the public about the early signs of cancer, their unreasonable hopelessness about the results of its treatment, their idea that the disease carries with it a sort of family stigma, their dread of the available means of cure by operation. It is a call to the public to save itself by seeking early advice about any suspicious symptom at a time when the disease is still curable.

Mr. Childe's book is the sanest and safest guide to cancer control which England has produced. He was a great admirer of your Society, which he described as "one of the most powerful public health agencies in the world."

The literature of cancer control takes one of two forms—the book or the leaflet. The book reaches directly only the educated public. As soon as they possess it they share with the doctors the duty of instructing the unlearned by word of mouth and this duty should be impressed upon them. The influence of books on cancer control is not measured by the numbers, but by the missionary enthusiasm of their readers.

CANCER LEAFLETS

Mr. Childe, however, was also the pioneer in the attempt to reach a wider circle of the public by means of health leaflets. Under his influence the public health authorities of Portsmouth issued in 1915 a leaflet on cancer and its early signs.

The Middlesex Hospital has also taken part in this effort. I have always felt that, just as a university possesses a press, so too should a great hospital, and thanks to the generosity of my friend, the late Mr. T. B. Lightfoot, the Middlesex Hospital Press was founded and partly endowed in 1920. The objects of the Press are to instruct the public in the care of its health by the publication of books and leaflets and to assist in the publication of research work and text books emanating from the Middlesex Hospital. The Press has published a series of health leaflets, including several on cancer. The leaflets are distributed at the Hospital and sold practically at cost to individuals and public health authorities. Last year, over thirty thousand leaflets were distributed, chiefly through a number of county and borough councils, and the work is still growing.

The Press has also published a work on *Cancer Research at the Middlesex Hospital, 1900–1924,* of which I bring you a number of copies as a gift from the Cancer and General Research Committee of the Middlesex Hospital.

THE PART OF THE DENTAL SURGEON IN CANCER CONTROL

For years past I have been struck by the fact that mouth cancer is very rarely seen in mouths which would be passed as "clean" by a dental surgeon. The education of the public in the care of the teeth, and even more of the gums, appears therefore to be an important measure of cancer control. The organization of the Ivory Cross, which provides dental treatment for those unable to afford it, therefore requires at least a passing mention here.

THE ENGLISH CONCEPTIONS OF CANCER CONTROL

Is it possible from the foregoing historical sketch of cancer education in England to construct a peculiarly English philosophy of cancer control? It is, I think, significant that the history begins with the foundation of a special institution for the segregation and intensive study of the disease. Of late years the principal effort has been in the direction of laboratory research, and even up to the present time the attempts at popular education about cancer have been sporadic and ill-supported, because of a general national skepticism as to their value and advisability.

The English conception of cancer control appears to be as follows:

Public education on the cancer problem has two branches: first, the education of the medical profession, and second, the elementary education of the lay public. Of these the first is the more important, because it provides a body of *viva voce* teachers, in constant and intimate touch with the laity and possessing the confidence of those to whom they speak. An instructed profession, conscious of its daily duty of teaching the laity the few broad truths they need to know, is the most powerful instrument available for the control of cancer.

In the medical profession itself education in cancer may be differentiated under four grades: (*a*) the specialist, (*b*) the general practitioner or family physician, (*c*) the public health expert, and (*d*) the dental surgeon.

EDUCATION OF THE CANCER SPECIALIST

The mainspring of any system of cancer education is the specialist, who acquires knowledge of the subject at first hand from the study of the disease in the wards or the laboratory, and the first essential in cancer education is to establish conditions under which the specialist is able to educate himself. For this purpose concentration, partial at any rate, of cancer cases in special institutions is indispensable. Cancer cases diffused more or less uniformly through general hospitals do not provide for the staffs of these institutions experience sufficient in intensity and volume to make experts. On the other hand, a wide general experience of surgery is a vital preliminary to the special study of cancer, and it may prove best to establish cancer institutions in close affiliation with large general hospitals. As to the number of special cancer institutions required, no law can be laid down. It is better, however, to have a few complete institutions, well spaced out geographically, than a large number of small and incompletely equipped ones. It is essential that the principal members of the staffs should give life service to the institution. The span of human life is all too short at best for acquiring a broad knowledge of such a multiform disease—a disease, too, which in its most chronic form may run a course of 40 years.

The cancer hospital, by undergraduate and postgraduate instruction and by the production of text books, should educate the other branches of the profession.

The cancer hospital with its body of clinical and pathologic experts requires the support of an educated lay public, influential financially, and possessed of sufficient imagination to know that the plant of knowledge is of slow and irregular growth and can be brought to fruit, none know when, only by long and patient toil.

Given the cancer hospital with its laboratories and trained staff, the next steps in cancer control become possible, namely: (1) the education of the body of the medical profession in the recognition of early cancer by undergraduate and postgraduate instruction, and (2) what is even more important, the provision of facilities for consultation with experts in doubtful cases.

To the medical profession, assisted by the educated lay public, there should be entrusted the duty of instructing the mass of the people, mainly by private influence and word of mouth, in the few essential facts about cancer which are necessary for their safety.

While I believe that this conception of cancer control is on sound evolutionary lines, I think it is incomplete and that, avoiding sensation and panic-mongering, direct popular education on cancer by lectures and leaflets must be undertaken in England to insure that sufferers seek early advice while the disease is still curable. I believe that our public opinion is slowly coming round to this point of view.

SEGREGATION OF CANCER CASES TO BE PARTIAL ONLY

It is not, I think, necessary or desirable that all cancer cases should be collected into cancer hospitals. The creation of numerous small and incomplete cancer hospitals is very undesirable. I estimate roughly that, for every 5,000,000 of the population, a cancer hospital of 200 beds should exist within a day's journey. The geographical spacing of cancer hospitals is very important.

COMPARISON OF CANCER AND TUBERCULOSIS

In the report for 1925 of the chief medical officer of the Ministry of Health which has just appeared, the remarkable contrast between the diminution of tuberculosis and the steady increase of cancer is again set forth. In 1884 the annual mortality rate per million persons living was 2,574 for tuberculosis and 563 for cancer. In 1925 the corresponding figures were 1,038 for tuberculosis and 1,336 for cancer. During the last 35 years the cancer mortality has doubled, and during the last five years there has been an annual rise of between 30 and 40 per million of the population in the number of recorded deaths for cancer.

Figures such as these indicate that increased effort is needed. Sir George Newman points out that the mortality rate is, even with our present knowledge, substantially reducible. Until a few years ago, he says, interest in cancer was restricted to doctors, and the interest of the layman was restricted to the bad effects of the disease within the circle of his acquaintance. The layman felt a positive disinclination to discuss or even to mention the disease. This attitude, he thinks, is now disappearing so that through the natural reactions of the medical and non-medical members of the community it has become possible, to the common advantage, for the disease to be as freely discussed as tuberculosis.

CONSULTATIONS

I venture to assert that the detection of early cancer is not a one-man job. It may require the co-operation of the patient, the family doctor, the specialist, and the pathologist. It may be impossible even then in some cases. The public should learn to distrust the family doctor who pretends to omniscience and is unwilling to share responsibility in difficult cases. In medical matters breadth and depth of knowledge are both necessary, but the qualities cannot be combined in one person. The captain of a salvage ship, having located a wreck, must call in the expert diver to explore it. In just the same way the treatment of a patient with cancer is a salvage operation requiring the combined effort of the family physician and the specialist.

CONCLUSION

I have not attempted to conceal my opinion that, at any rate in England, direct public propaganda will play a secondary and relatively unimportant part in the control of cancer. Public education in cancer matters is a problem in psychological reaction to a given stimulus and must be solved in each country in the way best adapted to the national character. There is, unfortunately, no standard work on international psychology, though if such a work existed it would probably be more useful than the League of Nations. For the present, each country must find out the methods which suit it best.

To ignore unpleasant facts which menace the future only is an English weakness. My countrymen retain throughout life the schoolboy's power of shutting the mind against unpalatable information. The indifference which, before the War, met Lord Roberts' campaign in favor of national military service is a case in point. This national trait is the greatest obstacle which cancer control in England will have to meet. It must overcome, not merely indifference, but the kind of resentment that the would-be suicide feels when his life is saved against his will. Our people react well to an immediate danger but not to a contingent one. The difference may be illustrated in figures by contrasting the results of an appeal for funds to arrest the subsidence of the dome of St. Paul's

Cathedral, with those of a very ably conducted and costly appeal about the same time to raise money for cancer research. The former effort produced in a few weeks £250,000, but the British Empire Cancer Campaign has hitherto, over a period of two years, secured only about £100,000. The English too are never disinclined for a gamble with Fate nor inclined to worry about the risks of life, regarding it as at best a dangerous business. When our Minister of Health announced in Parliament recently that 1 person in 7 of 30 years of age or over would die of cancer, I fancy most of his hearers reflected that, after all, favorable odds of 6 to 1 are good enough in this uncertain world.

THE ORGANIZED MOVEMENT AGAINST CANCER IN FRANCE

By Professor HENRI HARTMANN, Paris, France
Director, Anti-Cancer Center of Paris; Professor of Surgery, University of Paris

UNTIL within a few years the campaign against cancer in France had been the object of only a few isolated efforts of individuals who were moved by a sentiment at once charitable and religious. The first refuge for cancer patients was created at Rheims in 1740 by Canon Godinot; one century later, in 1842, Madame Garnier-Chabot founded at Lyons the Association of the Ladies of Calvary, a work which had a twofold end in view; first, to bring together widowed women in one great family for consolation through the exercise of charity toward poor sick persons and, second, to give free care in its hospital to unfortunate women afflicted with open cancers requiring dressings, cases that could not be cared for in hospitals because they were incurable. After the original establishment at Lyons, Calvaries were subsequently created at Paris, Marseilles, St. Etienne, and Bordeaux.

These Houses of Calvary gave excellent care to the sufferers, but they were in any case only charitable institutions where no attempt was made to study cancer or even to treat it medically, and where the chief concern was to render more endurable the existence of unhappy women suffering with ulcerous cancers.

Récamier was the first to create, in 1899, at St. Michael's Hospital, a little refuge, St. Vincent's Asylum, where it was not enough to give beds to the patients and to dress their sores, but where an attempt was made really to treat and study cancer, thanks to the addition of a laboratory to the hospital wards. The generosity of Madame A. Déroulède made it possible to enlarge this small hospital and to bring the number of beds up to thirty. The Administration of Public Aid at Paris had, for its part, merely set apart a few wards for inoperable cancer patients at the Salpétrière, at Bicêtre and at Brévannes. In fact, practically nothing had been done.

However, in 1892, Verneuil and Duplay had tried to create a movement for cancer control by founding a league, but this disappeared almost immediately after its foundation. The idea was taken up 15 years later by Poirier and Henri de Rothschild. In 1908 there was definitely started under the presidency of Bouchard, with Pierre Delbet as general secretary, the French Association for the Study of Cancer, the object of this Association being to study cancer and to seek means to control it. Its activities were to embrace: (1) the carrying out of research work and the publishing of articles about cancer; (2) the organizing of laboratories, dispensaries, hospitals, etc.; (3) the offering of subsidies and prizes to authors of works worthy of interest.

Practically, this was and is still today an association predominantly scientific, which seeks to centralize cancer activities and to provide monthly meetings at which interesting papers are read. At the present time it is managing an important publication, an atlas of the pathology of cancer, which reproduces at each point preparations that have been carefully controlled. Taken up almost entirely with the scientific side of questions, it has not reached the point of creating in France any true movement of cancer control.

THE REAL BEGINNING OF THE CANCER CONTROL MOVEMENT

Such a movement has been undertaken by a league, the founder of which was a woman, Madame Dr. Fabre. In 1917, when the war was still raging, she called a meeting of a number of Frenchmen, including Professors Achard, Borrel, Gilbert, Letulle, Hartmann, and Rogèr, together with a certain number of representatives of the English and American colonies in Paris. On December 13, 1917, at a meeting held at Professor Hartmann's house, it was decided to form a League against Cancer. This League was immediately joined by Professor Mark Baldwin, Messrs. Laurence V. Benet, Walter Berry, Wythe Branch, Major Lambert, Sir John Pilter, Schoninger, Madame Mildred Bliss and Lady Hearn, as well as by a large number of prominent French persons, the Duchess of Uzès, Mme. Eugène Simon, Dr. Henri de Rothschild, and others.

Lord Bertie of Thames, the English ambassador, and his Excellency William Sharp, United States ambassador, M. Leclainche, inspector-general of the Veterinary Service, M. Mesureur, director general of Public Aid, Professor Roger, dean of the Faculty of Medicine of Paris, and Dr. Roux, director of the Pasteur Institute, gave it their patronage. Since, therefore, from its very beginning this League contained representatives of three great allied Powers, it took the name of "The Franco-Anglo-American League against Cancer."

The League was definitely founded on March 14, 1918, at a meeting held at the Faculty of Medicine and its presidency was offered to M. Justin Godart, who was at that time under-secretary of state of the Health Service to the Minister of War, who had some time before showed the interest that he felt in the question of cancer by creating four centers for military cancer patients, two at Paris, one at Lyons, and one at Bordeaux.

From this moment the campaign was begun, and the general public consented to become interested in the question of cancer. Conferences were held in the most various classes of society, at the Lyceum and at the Sorbonne by Professor Hartmann, at the Red Cross Societies by Professor Roussy, at meetings of the League by Professors Regaud, J. L. Faure, Ledoux-Lebard, and others.

Instructive tracts were published and distributed by the hundreds and thousands, some addressed to the general public and some to doctors. A poster was prepared and sent into all the communes of France by the National Office of Social Hygiene.

At the present time the League is publishing in the French medical journal of widest circulation, the *Presse Médicale,* a series of short articles written exclusively from a practical point of view *upon the early diagnosis of the different forms of cancer.*

Communications have been made by wireless telephony. In order to facilitate the task of those holding conferences, the League has prepared a collection of instructive films which it has placed at their disposal, seeking to interest doctors and the laity in the question of cancer.

All these efforts have not remained without success, and under the prompting of the League we have seen created, in the different regions of France, various leagues against cancer: in 1922 the Lyons Association for the Campaign against Cancer, in 1923 the League of Burgundy against Cancer, the Anti-cancer Departmental League of the Maritime Alps, the League of the Department of Loire and Cher, the Regional League of the West, the Association of Bordeaux and the Southwest: in 1924 the Algerian League against Cancer, the Committee of Defense for l'Aveyron, the Regional League against Cancer of Tarn and Garonne, the Departmental Committee of Gard, and the Montpellier Association.

The public authorities for their part also took action. On March 26, 1921, the Municipal Council of Paris, following a report by Dr. Calmels, put at the disposal of the Administration of Public Aid a credit of 2,500,000 francs for the purchase of two grams of radium bromide and decided to establish services of radium therapy in a certain number of Paris hospitals, attaching them to surgical services already existing. The first two services thus created were that of the Hôtel-Dieu (Professor Hartmann) and that of the Tenon Hospital (Associate-Professor Proust). To each of these services were attached three technicians, one for X-ray therapy, one for radium therapy, and one for pathology, in view of the fact that the need seemed established for the examination of biopsy specimens and for experimental research on cancer. The following year, in 1922, at the opening of the general assembly of the Franco-Anglo-American League, over which he was to preside, M. Strauss, minister of Public Health, undertook to organize the campaign against cancer officially. By a decree dated May 31, 1922, he appointed a Commission having for its object the co-ordination of all work and effort with regard to the etiology of cancer, its pathogeny, its clinical study, its therapeutics, and its prophylaxis. This Commission, under the general presidency of Professor Quénu, was divided into five sections: (1) experimentation, pathogeny, and comparative pathology—president, Professor Letulle; (2) etiology and demography—president, Dr. Pottevin; (3) human pathology and clinical study—president, Professor Delbet; (4) therapeutics—president, Dr. Tuffier; (5) assistance, prophylaxis, and propaganda—president, Professor Hartmann.

THE CREATION OF THE ANTI-CANCER CENTERS

Upon a report brought in by the late Professor Bergonié, of Bordeaux, the Commission proposed by unanimous vote the creation of regional centers for a campaign against cancer, and defined the conditions under which such centers should be instituted. Almost immediately M. Strauss undertook the realization of the aims expressed by the Commission, which he had drawn up. In a circular letter dated November 25, 1922, he called the attention of the public authorities to the imperative necessity of organizing the campaign against cancer throughout the whole nation, and arranged the conditions for the creation of regional centers against cancer. These centers were not to be hospitals for incurable cases, but centers for treatment. The minimum number of beds was to be twenty. Each center was to receive for consultation the greatest possible number of patients, was to give the greatest possible number of sessions of X-ray and radium treatment, was to perform palliative or curative operations without delay, and was to send the patients thus treated to their homes and their families with the instruction that they were to return at a date fixed by the director of the center or his assistants. It was to contain three pieces of apparatus for deep X-ray therapy, functioning with at least 200 kilovolts and provided with every device for protection and security. The installation of this equipment was to be such that the apparatus could not endanger the health of the nurses or doctors called upon to use it, even though employed continuously all day long.

The endowment of radium for each one of these centers was to be at least 200 mgm. of radium element. With this minimum figure the functioning of the center would be assured at the outset, though it would no longer be so when cancer patients should come in greater numbers to seek the same relief that others had obtained.

All the resources of surgery were to be available. It must be possible for patients to be operated on, either in the attached surgical center or to be sent back for operation to the surgical service from which they had come.

FORM OF ORGANIZATION OF THE CENTER

In each anti-cancer center the treatment of the patients was to be assured as follows:

1. A clinician and a pathologist were to determine by a biopsy specimen the nature of the cancer to be treated.

2. A surgeon was to take charge of any curative or palliative operations that should prove necessary.

3. A medical man with a complete understanding of deep X-ray and radium therapy was to have the direction of these applications.

4. A physicist was to be on hand who could, either continuously or from time to time, serve as a consultant with regard to the use of instruments for treatment or measurement.

The directorship of the Center against Cancer was to be given to one or another of these experts, without such directorship diminishing in the least the value of the advice of collaborators who might be called into consultation in difficult cases.

The auxiliary personnel (electricians or nurses) is to be chosen with care and after particular tests, the rôle of the individuals composing it being the more important from the fact that they would have to handle powerful instruments, both fragile and costly.

The idea was, in short, to extend to all France an organization similar to that created in Paris in 1921. A credit of 6,000,000 francs voted by Parliament in 1922 permitted the immediate purchase of radium. Centers were rapidly established at Lyons, Bordeaux, Toulouse, Montpellier, Nancy, Strasbourg, Nantes, Rennes, Angers, Marseilles, and Rheims. Requests for anti-cancer centers came from a large number of other cities, but had to be refused for lack of money. When the Cancer Commission was consulted, it expressed the wish that the creation of centers should be authorized only in those cities where resources already existed, not only in the matter of experts but also in material equipment—conditions which, apart from a few rare exceptions, are not found in combination except in cities where a center of medical teaching exists. So it was decided that no center should be created outside of a city that was not already the seat of a faculty of medicine. This measure has not prevented the creation of anti-cancer centers in towns without a faculty or school of medicine, but such centers are not official and cannot participate in Governmental grants.

In the region of Paris the establishment of centers has been important. In addition to a departmental center at Villejuif, there exist at Paris, in the hospitals depending on public aid, 6 centers against cancer: the Hôtel-Dieu, the Lariboisière, the Necker, the St. Antoine, the Salpétrière, and the Tenon.

Among these different centers there have been distributed 2.855 grams of radium element, as follows:

Tenon	850 mgm.
Hôtel-Dieu	500 mgm.
Salpétrière	500 mgm.
Necker	350 mgm.
Lariboisière	350 mgm.
St. Antoine	305 mgm.

For deep X-ray therapy these centers against cancer have at their disposal 18 pieces of apparatus and 24 tables for treatment.

Hospitals	Number of pieces of apparatus	Number of tables for treatment	Observations
St. Antoine..........	3	3	
Lariboisière..........	2	3	
Tenon..............	2	3	
Salpétrière..........	2	3	Constant tension apparatus[1]
Hôtel-Dieu..........	1	2	
Necker.............	1	2	Constant tension apparatus[1]

[1]The constant tension apparatus of the Gaiffe type, like those of the Casel type, can be used with two treatment tables for a single generator.

From the point of view of hospitalization of the cancer patients the general Administration of Public Aid at Paris has similarly made an effort. Whereas before the war it had made special provision for only 42 beds for cancer patients (18 for men at Bicêtre and 24 for women at the Salpêtrière), at the present time (without counting those cancer patients receiving hospital treatment in the general medical and surgical services) it has at its disposal 333 beds which are theirs exclusively, 214 for those who can be helped by X-ray or radium treatment, and 119 for incurable cases. To these may be added a certain number of incurable cancer cases in persons of advanced age who are cared for in hospitals for aged people: at the present time there are 44 of these at the Salpêtrière.

SOCIAL SERVICE AND FOLLOW-UP WORK

To the various anti-cancer centers of the Paris region there is attached a social service which is carried out by 80 lady visitors, all volunteers, belonging to the Franco-Anglo-American League. Some of these visitors belong to the hospital service. These women bring to our patients a moral support, helping and encouraging them in a thousand ways. They are also present at consultations, where they fill out for each patient a social record card which permits of a follow-up after he leaves the hospital. This record which, as a medical indication, mentions only the site of the disease and the dates of the interventive measures carried out, is further continued by other visitors in the home, the patients being allotted to them no longer according to the hospital but according to the quarter of the city. More than nine thousand patients have already been followed up by our visitors, who, besides deciding what help shall be given to the ex-patients and also to their families, follow the progress of each case and thus permit the doctor to find it again when he wishes to study the late results of the various treatments.

THE RADIUM INSTITUTE

Certain centers have reached a considerable importance. Such is the center of the Radium Institute, the most important of all those existing today in France. Depending at the same time on the University of Paris and the Pasteur

Institute, this Institute, whose construction was begun before 1914, was not finished until after the end of the terrible war which we had to undergo. It contains two parts: a laboratory where Madame Curie carries on physical and chemical research work, and a center for the treatment and study of cancer, directed by Professor Regaud.

In the first of its buildings, the Henri de Rothschild Pavilion, are a receiving bureau and the record office, a service of general and private consultation, a hall for meetings, a service for applications of radium therapy (consisting of a laboratory for preparation and rooms for treatment), rest rooms for the patients, and laboratories of pathologic histology, bacteriology, hæmatology, and photography. In the second building are the X-ray apparatus, a room for X-ray diagnosis, and the work-rooms.

The Radium Institute, besides having 2.50 grams of radium which Madame Curie uses in her experiments (1.50 grams prepared by the Curies, and 1 gram presented by American women), possesses 2 grams of radium of its own and has in addition 5 more grams at its disposal which have been lent to it by the Mining Union of Haut Katanga. The number of units of X-ray apparatus is 6, with 8 places for treatment. The personnel is composed of Professor Regaud, director; M. Lacassagne, sub-director, and Messrs. Octave Monod, Coutard, Richard, and Pierquin, in charge of the radium and X-ray therapy, with M. Roux-Berger for surgical interventions, M. Wolfrem for urology, M. Hautant for otorhinolaryngology, M. Grigomoff for pathologic histology, M. Lavedan for hæmatology, and Messrs. Muternilch and Vinzent for bacteriology. Besides these laboratories for examination, which form an integral and necessary part of the therapeutic services, the Institute has also a laboratory of physics and radiologic technique, directed by M. Ferroux, and a laboratory of experimental histology, in charge of Messrs. Jolly and Sammssonow. This personnel gives its full time to the Institute.

Up to 1925, 7,431 patients had come for consultation to the Institute and 2,625 had been treated; 6,756 histologic examinations were made and more than a thousand bacteriologic, hæmatologic, and serologic examinations carried out.

The weakest part of the organization is on the side of hospitalization: the Institute has only 18 beds for the poor at the Pasteur Hospital and 20 beds in a private sanatorium. A subscription is at the present time being opened by the Curie Foundation for the creation of a real hospital as an annex to the Institute. The Franco-Anglo-American League has just contributed 100,000 francs to this subscription. If the project materializes, as we hope, there will be in this institution one of the most important centers for the treatment of cancer and for scientific research. Numerous works already published, both scientific and practical, establish the importance of this center.

Nor is the teaching service neglected. Two series of courses are given here every year. In addition, both French and foreign doctors are admitted up to the number of 4 at maximum, and on the understanding that they are to remain from 4 to 6 months.

CENTERS FOR STUDY

Two other centers of study are at present in process of construction: the Bergonié Foundation at Bordeaux, and the Institute for Research and Treatment of Cancer, just established at Villejuif in the Paul Brousse Hospital. The latter, under the direction of Professor Roussy, is attached to the Faculty of Medicine of Paris. It has two sections. One of these, the scientific, installed at the Faculty of Medicine, contains research laboratories (pathological anatomy and physiology, physicochemistry, biological and serological chemistry), as well as a museum and a library. The other section is concerned with hospitalization and is represented by the Anti-cancer Center of the suburbs of Paris, at the Paul Brousse Hospital at Villejuif.

A foundation has been created with a view to bringing together the necessary capital for the erection of buildings at the Paul Brousse Hospital upon land granted by the General Council of the Department of the Seine to the Faculty of Medicine. After these buildings have been erected, the laboratories, museum, library, and hospital wards will all be brought together into one place.

As can be seen by the account that we have just given, if France was late to enter into the campaign against cancer, she has in recent years made a very considerable effort. It is permissible to say at the present time that the campaign is really organized.

THE ORGANIZATION AND PRACTICAL WORKING OF THE CENTERS AGAINST CANCER IN FRANCE

By PROFESSOR LÉON BÉRARD, LYONS, FRANCE
Director of Anti-Cancer Center at Lyons; Professor of Surgery, University of Lyons

IN view of the fact that the general question of the "Objects and Methods of the Organized Movement against Cancer in France" has been assigned to my colleague, Professor Hartmann, for treatment, I shall confine myself in this paper to a consideration of the matter indicated by its title, without sketching any historical outline.

However, for a proper understanding of the subject I must recall that the minds of the French people had been prepared for the idea of anti-cancer centers—

1. By the creation in 1908 of the French Association for the Study of Cancer, a society for research and scientific discussion, of which Professor Bouchard was president.
2. By the establishment in 1918 of the Franco-Anglo-American League for the Control of Cancer, presided over by the chief minister of Public Health, M. Justin Godart. This latter foundation was directed more especially toward the social anti-cancer campaign in accordance with the same principles as those of the American Society for the Control of Cancer.
3. By the organization in 1919 of the services of the Radium Institute, attached to the Pasteur Institute and directed by Professor Claude Regaud.

HOW THE ANTI-CANCER CENTERS WERE CREATED

The creation in France of regional anti-cancer centers was decided upon in 1922 by the minister of Public Health, M. Paul Strauss, at the request of the Cancer Commission which he had founded the same year.[1] This Commission, composed of eminent physicians and surgeons, and persons belonging to the Pasteur Institute, the Faculty of the University, and the Government, under the presidency of Professor Quénu, had for its purpose the co-ordination of all undertakings and efforts related to the etiology, pathogenesis, clinical study, therapeutics, and prophylaxis of cancer. It was at a sitting of this Commission on November 17, 1922, that Professor Bergonié of Bordeaux made an address on the subject of the creation of regional anti-cancer centers, the idea of which he was the first to formulate. Himself already a victim for several years to radiologist's cancer, which had finally necessitated the amputation of his right arm after he had undergone a number of minor mutilating operations, Bergonié, a model of stoicism and civic virtue, spent all the time which his suffering permitted in directing the campaign against this terrible disease of which he knew he would never be cured.

---

[1] At the close of the war (1919) there had already been organized in the large cities, such as Paris, Lyons, and Bordeaux, under the name of Anti-Cancer Centers, services under which all combatants and mobilized men affected with cancerous diseases were grouped together and cared for. I should say, also, as a Lyonnaise, that as far back as the beginning of the eighteenth century the Academy of Belles Lettres, Sciences and Arts of Lyons had opened the field for an anti-cancer campaign by proposing a prize for an essay on the following subject: "Research as to the Causes of the Cancer Evil, with a View to Determining Its Nature, Its Effects, and the Best Means of Controlling It."

It was also at Lyons, in 1842, that a young widow, Madame Garnier, founded the admirable work of Calvary, by receiving in her own home two moribund cancer patients who had no other refuge. Aided then by several other widowed women she dedicated herself to the care of women suffering from incurable cancer, giving them at the same time the consolations of religion and of the most sisterly love. At the present time the Hospital of Calvary has at its disposal in Lyons 150 beds for women suffering with incurable cancer, and the Hospital of the Cross, created in the same spirit in 1878, for men, has 60 beds. More than 10,000 cancer patients have been given hospital care up to the present time in these two establishments, which have served as models for all the other Calvaries founded later in France and other countries—for instance, the admirable foundation of Mother Alphonsa Lathrop in the United States.

It was his desire that throughout French territory physicians and patients should be thoroughly instructed with regard to the following subjects:

1. The sanitary and hygienic measures that are capable of decreasing the frequency of cancer; also the dangers of syphilis, tobacco, alcohol and all infections and chronic irritations, as agents that may produce cancer or predispose to it.
2. The means of ferreting out and treating precancerous lesions before they become malignant.
3. The means of diagnosing neoplasms as early as possible after their appearance and of treating them with the maximum chance of success.

To attain these ends Professor Bergonié gave the name of "Regional Anti-Cancer Centers" to his organization in the various university cities where instruction was already given in medicine. The various services of these centers, arranged in close co-ordination, were to have a twofold purpose: (1) to study the problem of cancer, and (2) to assure the treatment of cancer patients by the most scientific methods.

Upon motion of Professor Bergonié the following resolution was adopted:

> With a view to arranging the conditions for the establishment, functioning, and maintenance of regional anti-cancer centers close to the principal medical faculties of France, the Cancer Commission asks the Government to make the necessary appropriation for the immediate creation of these centers. It begs the General Councils and Municipalities to set aside the necessary funds to cover the expenses of an organization, including the purchase by each center of at least 200 milligrams of radium element, and of 3 pieces of apparatus for deep X-ray therapy.

With this end in view a ministerial circular letter was addressed to all the Prefects on November 25, 1922, and steps were taken at once to carry out this program.[1]

Thus it came about that the 13 centers were created, each one including a number of departments according to its importance:

City	Date of establishment	Director
Bordeaux	April 17, 1923	Prof. Bergonié until 1925, then Prof. Sabrazes
Toulouse	June 4, 1923	Prof. Marie
Lyons	August 10, 1923	Prof. Bérard
Montpellier	October 26, 1923	Prof. Forgues
Strasbourg	November 19, 1923	Prof. Gunsett

---

[1] This was at the time when great hopes, which have not been altogether realized, were placed upon deep X-ray treatment and when radium was being used chiefly in small amounts in fractional doses. It became necessary to endow each one of the centers with more than one gram of radium.

City	Date of establishment	Director
Nancy	March 13 1924	Prof. Vautrin
Rheims	March 26, 1924	Prof. Baud
Nantes	March 29, 1924	Prof. Gauducheau
Rennes	April 30, 1924	Prof. Marquis
Angers	July 5, 1924	Prof. Papin
Marseilles	October 12, 1925	Prof. Reynes
Paris	October 28, 1925	(the officer-in-charge of the service takes the place of director)
Suburban Paris, Villejuif	December 14, 1925	Prof. Roussy

At Paris the Radium Institute, which is a part of the Pasteur Institute and is directed by Professor Regaud, had been since 1919 an important center of study and treatment. For Paris and its suburbs, the regulations of the Ministry of Public Aid made it difficult to create other autonomous foundations similar to those of the Radium Institute and the anti-cancer centers of the provinces. This is why it was decided to install at once in the hospitals of Paris 6 Services of Clinical Therapeutics of Cancer, distributed as follows:

1. The Tenon Hospital	Dr. Proust
2. The Hôtel-Dieu	Prof. Hartmann
3. The St. Antoine Hospital	Dr. Lapointe
4. The Necker Hospital	Dr. Robineau
5. The Lariboisière Hospital	Dr. Labbé
6. The Salpétrière	Dr. Gosset

The Hospital of Brévannes (Dr. Renaud) received incurable cases of cancer and those patients, already treated, who were awaiting a second application of X-rays or radium.

Then, quite recently, in 1926, there has been founded at Paris a Cancer Institute, at the head of which Professor Roussy has been placed as director.

THE ADMINISTRATIVE ORGANIZATION OF THE CENTERS

The Administrative Council is charged with looking after the interests of the center, the budget of which is, in principle, attached to that of the faculty or school of medicine near by. Without there being any absolute obligation, certain centers depend for their budget on the Departmental Council of Public Health.

The directors and chiefs of service are chosen by the minister of Public Health, upon the recommendation of the Councils of Administration, after he has conferred with the faculty or school near the center. In a general way the personnel includes four chiefs-of-service, from among whom the director is chosen: of these chiefs one is a surgeon, one a clinician and pathologist, one a radiologist, and one a physicist. Each service is provided with laboratories.

According as the director is a surgeon, clinician, radiotherapist, pathologist, or physicist, the scientific orientation and the therapeutic methods of the various centers may differ from one another to a considerable extent. It is my personal opinion that the director should be first and foremost a clinician.

VARIOUS IDEAS AS TO THE ORGANIZATION OF CENTERS

A. As regards the Lyons Center, the organization that has been adopted is as follows:

In the Section of Therapeutics, which is under our directorship and is annexed to our Surgical Clinic at the Hôtel-Dieu of Lyons, we have as collaborators: Associate Professor Santy, Associate Professor Dunet, and Dr. Colombet, for surgical interventions, biopsies and radium application; Dr. Malot, monitor of the Clinic, for treatment with X-rays; Dr. Tellier, in charge of courses at the Faculty of Medicine, for stomatology and dental prosthesis; Dr. Sargnon, for endoscopy.

In close association with the therapeutic section the following services have been organized:

1. Diagnosis and histologic control, and cytologic study of tumors, under Professors Paviot and Policard, in their respective laboratories of pathologic anatomy and histology at the Faculty of Medicine.
2. The study of skin cancers and their relation to infections, under Professor Nicolas and Associate Professor Favre, in the Cancer Section of the Bacteriologic Institute.
3. Biology, social hygiene, prophylaxis, demography, and statistics of cancer under Professor P. Courmont, at the Bacteriologic Institute of Hygiene of the Faculty of Medicine, and by Dr. Vigne, director of the Bureau of Public Health of the City of Lyons.
4. Finally, a section of physics for the study of physical agents and the control of X-ray and radium apparatus is under the direction of Professor Cluzet and Associate Professor Nogier.

In addition to our medical collaborators, assistants, chiefs of clinic, internes, students, licentiates, and official preparers of the various services, all of whom take part in the work of the center, most of them without special compensation, it was necessary to engage and appoint: (1) two new assistants to prepare sections for biopsy and to make microscopic examination; (2) two secretaries to correspond with patients and administrative authorities, to gather statistics and record observations; (3) a technician and an orderly to manipulate the X-ray apparatus.

The hospitalization of patients has been arranged in the following manner, with a view to keeping them as far as possible in ignorance of the nature and gravity of their affection:

1. All those who have need only of surgical treatment are left in the general wards of the clinic, or simply isolated in special rooms if they are cases involving a preternatural anus or with offensive ulceration. Incurable cancer patients are transferred to the two hospitals of Calvary, the origin of which we have referred to above.

2. Patients treated by radium and carrying costly forms of apparatus which it is necessary to watch closely are grouped in several small isolation wards which have a total capacity of 15 beds.
3. Two wards of 15 beds each receive ambulant patients before they are treated with radium or while they are undergoing treatment with X-rays.

The Lyons Center has at its disposal 1.30 grams of radium and 3 pieces of apparatus for deep X-ray therapy.

A daily charge of some 20 francs per patient, at the present rate of exchange, is made by the City Hospital, with a supplement for the benefit of the center of 200 to 600 francs for patients who are in modest circumstances but not indigent, the amount varying according to the resources of each and the expense of special treatments with radium or X-ray.

The advisory committee handling administrative questions consists of the following persons: the dean of the Faculty of Medicine, as president; the director of the center, as general secretary; two delegates of the City Hospital of Lyons; two delegates from the General Council of the Rhone; two delegates from the Municipal Council of the City of Lyons; two delegates from the Chamber of Commerce, and eight delegates from the Lyons Association for the Campaign against Cancer.

As can be seen from the above enumeration, our Lyons Center has been installed in places already in existence by utilizing the services, as well as the personnel, of the Faculty of Medicine and such hospitals as might lend themselves to this adaptation with a minimum of expense. Thanks to the generosity of the Lyons Association against Cancer (a subsidiary of the Franco-Anglo-American League), of the municipality and of the Administration of the City Hospital of Lyons, we have been able to collect nearly 1,000,000 francs to equip and finance all the services of this center, whose annual budget reaches about 100,000 francs.

B. But it was quite another plan which Professor Bergonié had in mind, in accordance with which the original anti-cancer centers were to be installed in quarters constructed especially for them, with a view to this kind of use and organized with all facilities for cancer work. "It is necessary at the outset," said Professor Bergonié, "to act on a large scale and with a definite end in view, if one wishes to do effective and, I may say, economical work. What is in fact more costly than halfway measures, narrow views, local provisions, insufficient laboratories, and an over-worked and discouraged personnel? I have the vision of this dispensary and clinic for cancer rising like a monument, erected not far from the center of our large university cities and within easy reach of the main lines of transportation, with consultants coming in some cases from a great distance! I see this lofty monument—for the cost of land is high!—composed of several stories, of which the ground floor, reached by steps, will receive consultants and pupils (coming for instruction and advice), while the basement, above the ground and well lighted by large windows, will house all the equipment for radium and deep X-ray therapy, with the beam of X-rays of each apparatus directed vertically toward the ground in order to eliminate all danger of injury.

"On the first floor above the ground floor will be the laboratories: the surgical laboratory will adjoin the physical, and the chemical will adjoin the pathological, etc. There will be operating rooms both for *homo sapiens* and for his lower brethren.

"Above the laboratories will be the wards for patients, with about 60 beds including isolation wards; still above these will be the dining room and living quarters of the personnel, for there will be, according to the American expression, not a few 'full-times,' both among the superior assistant personnel and the secondary assistants."

At the price today of building construction such an equipment, comprising all the necessary rooms for consultation and treatment, all the laboratories, with a hospital of 60 beds—that is to say, able to house 60 patients and 30 assistants, internes, orderlies and nurses—would cost at least eight to ten million francs for building and equipment. The annual budget of such a center would reach more than 1,600,000 francs and the price for hospitalization would exceed 60 or 80 francs a day. Yet this is what Professor Bergonié wanted to realize at Bordeaux and what our colleagues at Toulouse and Nancy equally had in view.

Unfortunately, organizations so perfect and so admirable in principle would run the risk of remaining unfinished. In our country, bruised by war and condemned for a long time yet to submit to forced economies, it is important to secure a maximum of useful return for the minimum of expenditure.

Besides, we ask, is it the part of wisdom to engage in such considerable expenses for the construction and installation of services that are, so to speak, a finality, when our ideas and therapeutic methods may change overnight?

The very first thing necessary is to dedicate our resources, which are so limited, to keeping the centers alive and productive. Let us not forget that the annual expenses of running a complete center, even while utilizing to the maximum the organizations that are already in existence, will reach 200,000 or 300,000 francs, if we wish to pay what they deserve to all workers of whom we demand full-time service, if we acquire and maintain the necessary apparatus and equipment, and meet the expenses of the laboratory annexes.

Now, up to this time the anti-cancer centers have had only uncertain means at their disposal. In 1924, upon motion of Minister Strauss, the Government voted a credit of 6,000,000 francs to purchase the radium that was indispensable to the equipment of the centers (some 7 gm.). Then an appropriation of 2,000,000 francs was made for their organization, management, and equipment.

The same appropriation of 2,000,000 francs has been written into the budget of 1926. This will not be sufficient, since nothing has been provided for paying the personnel.

The regional centers continue to live only by virtue of aid granted by the Departments and Communes under whose jurisdiction they happen to be, and thanks to voluntary contributions given by private individuals.

RESULTS ATTAINED

However, most of these precarious foundations are already rendering the service which was expected of them.

So far as the single Center of Lyons is concerned, there were cared for in 1924 and 1925 more than 850 patients, 735 of whom were brought to the free clinics which were held twice a week before doctors and students. Nearly 600 of these patients have been received into our services or into those of the Hospitals of Calvary.

More than 1,500 examinations of sections from biopsy or operative material have been carried out in the laboratories of the center, both for ourselves and for the surgeons of Lyons and the surrounding region.

More than 200 preparations of serums and vaccines have been placed at the disposal of patients suffering with neoplastic affections or associated infections.

The permanent control of tubes of radium and of X-ray apparatus used in the center has been assured.

Work has been done upon experimental tar cancer (Dunet), upon cancer provoked by ingestion of cancer products (Arloing and Jusserand), and upon the culture of cancer cells (Policard).

Meetings have been held and posters placed in the town-halls, schools, post-offices, and banks to make the public understand the first signs of cancer, to recommend to all persons over the age of 40 that they submit to an immediate examination by their physician as soon as they experience the least discomfort, and to call the attention of general practitioners to the conditions in which the best treatment can be instituted with the least delay.

We have to admit, however, that the results are not yet in proportion to the efforts made, for several reasons:

1. The public authorities and private administrations have not yet fully understood the importance of this movement and have not given it the necessary encouragement. A number of general councils and municipalities have not voted the appropriations that were expected from them, although the centers agreed to treat all poor persons free of charge, for an annual grant of 15,000 to 25,000 francs, according to the importance of the Department.

2. Too often extra-medical influence, emanating particularly from parliamentary circles, has been exerted in an attempt to secure the creation, in cities that are without the necessary scientific elements, of foundations which would have nothing but a façade and before which the efforts of doctors and the confidence of patients would alike fall to the ground. The entire energy of the Cancer Commission and its spokesman, Professor Regaud, were required to make clear

the dangers of this excessive multiplication of centers, especially since numbers of cancer patients who need only surgical treatment can be operated upon correctly outside of the centers, and the treatment of most skin cancers, at least in the beginning, can be carried out by any competent radiologist with X-ray apparatus of limited power.

3. The centers have not the legal status which would permit them to receive legacies directly or to possess an endowment. They must still remain under the budgetary protection of the medical schools to which they are attached, or be sheltered behind Councils of Public Health or incorporated charitable foundations, such as the Lyonnaise Association for the Control of Cancer, which up to the present time has served as financial trustee of the Anti-Cancer Center of Lyons.

4. Finally, far too many patients and a good many physicians also are still ignorant of the conditions under which the therapeutic resources of the centers must be utilized, if an adequate return is to be obtained from them, and they do not understand the need of appealing to the centers with the least possible delay. In our country of individualism, people yield only slowly to new forms of discipline which seem to strike a blow at individual initiative. This is why far too many cancer patients are at first cared for at home and come to us only as a last resort. This is the reason, too, why in 1925, almost 30 per cent of those consulting our center were almost moribund and why more than 50 per cent of patients were in a stage where cure was already impossible because they had come too late.

When the time comes that patients are more careful about their health; when adult subjects, even while apparently in perfect health, demand of their doctor as they do of their dentist a periodic examination which shall serve as a true inventory, with direct examination of all regions that are habitually affected by cancer (skin, mouth, digestive tract, genital organs, breast, etc.); when transillumination and palpation of mouth and vaginal and rectal exploration shall be regarded as indispensable parts of these examinations; when the discovery of a suspicious lesion by the doctor shall cause him to do a biopsy rather than to give specific test treatment; and when, finally, patients are willing to go without delay to surgeons, physicians, and radiological clinicians who seem to answer their needs, the number of cancer patients will diminish, for many precancerous lesions will be treated and cured. When cancer has actually set in, it will be possible to attack it and overcome it with chances of success whose proportion will surprise physicians and patients.

It is toward these ends that we should direct our propaganda more and more actively, so that people may no longer regard the anti-cancer centers as courts that are to perform miracles or as the final destinations to which moribund people may come to finish out their miserable lives in a place of suffering and horrors.

There is no better guide that we can take for our own program than that which the American Society for the Control of Cancer offers.

THE NEED OF SPECIAL INSTITUTIONS FOR INVESTIGATION AND TREATMENT OF CANCER AS COMPARED WITH OTHER METHODS OF DEALING WITH CANCER PATIENTS

By Professor T. MARIE, Toulouse, France
Professor, Faculty of Medicine and Pharmacy of Toulouse; Director, Regional Anti-Cancer Center of Toulouse

IN order to show immediately the importance of the creation of these special institutions which constitute the regional anti-cancer centers, it suffices to call attention to the conditions that existed in France before they were established. These may be summed up as follows:

1. A double laboratory of research at the Pasteur Institute and at the University of Paris, consisting of a laboratory of scientific research, directed by Madame Curie, and a laboratory of biological and therapeutic research, directed by Professor Regaud.
2. A society, the French Association for the Study of Cancer, where questions belonging to this subject were discussed.
3. A national League, the Franco-Anglo-American, which encouraged the campaign by granting financial aid to various undertakings.
4. A series of Calvaries organized in the principal cities of France for the hospitalization of incurable patients.

Cancer patients were distributed among the different hospital services, skin cancers being assigned to the department of dermatology, and certain deep cancers of the internal organs to the medical department, but most of these to the surgical department. Radiologists served merely to supplement the work of the surgeons. This scattering of the patients had the gravest of consequences; it caused that absence of method and especially of co-ordination of all the different therapeutic procedures which we have seen continued too long in our hospitals—each one, surgeon, physician, and radiologist, having a natural tendency to give preference to the form of treatment which he understood, and to exclude those forms which he understood little or not at all.

Another result of this scattering of patients was the absence of all the prophylactic work so especially necessary in the control of cancer. No serious or methodical effort was made to call the attention of patients to the conditions that produce cancer, to the rapid spread of the disease to other parts of the body, or to the possibility of cure if operative methods are undertaken sufficiently early. Furthermore, in the absence of specialists and consultations outside of the hospital, patients who feared surgical operation lost valuable time before having recourse to medical advice.

WHY THE CENTERS WERE CREATED

The change of front that came about in the treatment of cancer when radioactive substances and deep X-ray therapy began to be employed has fortunately succeeded in modifying this state of mind and in making everyone, doctor, surgeon, and radiologist, feel the pressing need of co-ordinating efforts and of defining accurately the indications for these different methods of procedure.

The creation of regional anti-cancer centers had for its first result the realization of this co-ordination of efforts and this unity of action, the necessity of which the whole world was beginning to feel. They are, in fact, first of all administrative centers which function in close connection with one another and with the Minister of Public Health, who periodically arranges meetings of their directors where decisions can be made by all in common. In this way it has been possible to give a truly national character to the anti-cancer campaign in France.

Thanks also to the very great moral influence which the anti-cancer centers exert in their communities, they have succeeded in obtaining from the general councils of the surrounding Departments important grants of financial aid, which have been added to those received from the Minister of Public Health. At Toulouse the amount collected in this way already exceeds 850,000 francs, and it was not begun until 1924.

The creation of these special institutions for regional anti-cancer work has been no less important in bringing about a much more complete and searching examination of patients and in assuring in this way a better result from the treatment chosen. What we should seek is not in fact an amelioration of cancer and its apparent cure for a few months, but its complete cure, which means the final destruction of every cancer cell. In fact, if a single cell persists with sufficient vitality, this is enough to produce a recurrence. Malignant cells may be arrested in their multiplication and development for several months and may even regress, yet not be killed. This is why a permanent cure is as difficult as its apparent momentary cure is easy.

Examination of patients should be made with a view not only to diagnosis but also to prognosis and results of treatment.

Pathologic examination is not only necessary before the beginning of treatment in order to determine whether the patient is suffering with cancer and, if so, with what form of cancer, but it must also be made during treatment, for the purpose of watching its effects, and after treatment, in order to determine whether the destruction of cancer cells is complete and to avoid confusing a necrosis, due to excessive dosage, with a recurrence, due, on the contrary, to an insufficient dosage. Microphotographic reproductions of biopsy sections made at different periods should accompany the observation of the patients.

There should also be made—before, during, and after treatment—clinical examinations, X-ray examinations, determinations of blood pressure, of the amount of hæmoglobin, the blood count and resistance of blood corpuscles, the differential white blood count, the saline concentration of the blood, the study of urinary examinations and so forth, all of which constitute, along with biopsy, a complete examination of the patient.

The treatment which is chosen after this for each patient should take into account not only the results of the different examinations but also the experience acquired in the treatment of similar cases, the material resources available, and the experience of the auxiliary personnel which will be in charge of making the applications and supervising the results. These observations apply in much less degree to surgical interventions, the technique of which has long since been established and perfected in its smallest detail, than they do to the employment of radiations. Thanks to the continual improvements made in the material equipment for the deepest X-rays, and thanks to the ease with which radio-active substances can be divided into small charges, whose weight value is accurately known, it seems as if treatment by radiation were readily available to the whole medical personnel, both physicians and surgeons. But this is only seemingly the case and is in fact far from being true. It is a fact that the number of factors, both biological and physical, which are concerned in treatment by radiation is extremely numerous and an oversight with regard to the action of a single one of them or even an inexact measurement is enough to change the result. Rational employment of radiation requires not only a particularly experienced person, one competent to establish what shall be the conditions of treatment, but also a staff of experienced assistants, who are careful and dependable. These individuals should be recruited with the greatest possible care. To establish a rational treatment by radiation, simple clinical experience is not enough, for the effect produced varies widely with the physical conditions of the action (the intensity of each focus, the form, direction, grouping, distance chosen, filtration, etc.). Clinical observation must even here be helped out by the laboratory, which makes it possible to establish in each particular case what is the intensity of the radiation acting on each point of the surrounding space. In the majority of cases it is useless to look for absolute values, which are always difficult to establish. In view of the fact that the radiations utilized in anti-cancer therapy always have very short wave lengths, which closely approximate one another, the relative values are in most cases sufficient, provided they are established with adequate care and precision. Experience has shown me the great importance of these measures in connection with therapeutic application, and I have sent your Society a long paper showing in detail the first results that I have obtained.

The enumeration that I have just made of the conditions under which examination and treatment of cancer patients have to be carried out suffices to show the need of special institutions for their realization. The surgical services, especially in provincial hospitals, do not possess an auxiliary personnel that has the necessary experience and specialized knowledge. The radiologic laboratories as a rule do their work a little apart and are often more interested in diagnosis than in treatment. What was needed was an organization in which the whole effort should be directed toward the anti-cancer campaign. The essential purpose of

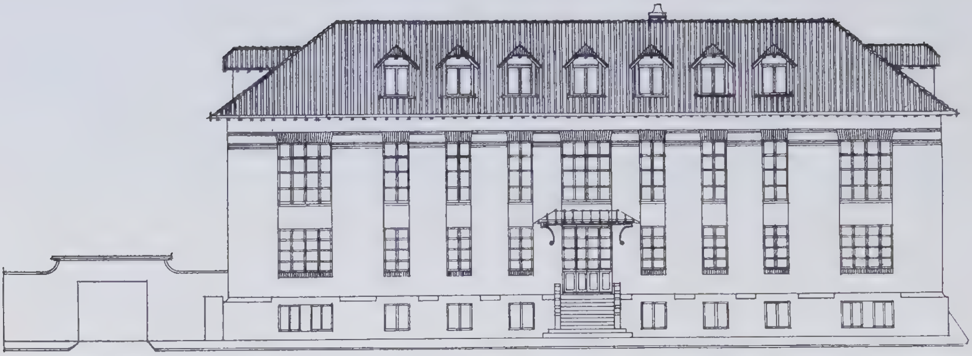

Fig. 1. Front elevation, Regional Center of Toulouse for Control of Cancer.

the regional anti-cancer centers is scientific research, rational treatment of patients and educational work, of which I shall speak further on.

THE ORGANIZATION AT TOULOUSE

At Toulouse, from the beginning, the Council of the Faculty of Medicine and Pharmacy, on which we depend scientifically, decided that the Regional Center should be a co-ordinated undertaking under which all forms of hospital service (not only those depending on the Faculty but also those depending on the Administration of Hospitals) might participate on an equal footing. The same decision applies to the laboratories for teaching and scientific research which exist in the localities of the Faculty and the hospitals. This decision of the Council of the Faculty, which permitted the utilization for the anti-cancer campaign of the scientific and medical resources already at hand, has had a considerable practical importance, for it has made it possible to restrict new undertakings to those necessary for the filling of existing gaps. The new building which has been erected in the gardens of the Hospital of the Grave, the plans of which are attached to this paper (Figs. 1–7), is the regional administrative center and is at the same time the service charged with the treatment of cancer patients by radiation. It works in close association with the laboratories and clinical services of the Faculty and hospitals, so that there is no overlapping. The consultations are made in collaboration with the six surgeons who take turns in having charge of the examination of the patients, and with the director of the Center, who has charge of the examination and treatment by physical agents. The treatment which is chosen is thus established by common agreement when the examinations are finished. Surgical specialists are not called to every consultation but remain in constant co-operation with the director, as do also the physicians, who are always allowed to be present at the consultation and who often take advantage of this privilege. The co-ordination of all efforts, so desirable to render the anti-cancer campaign effective, is therefore realized at Toulouse in the most complete manner. The laboratories

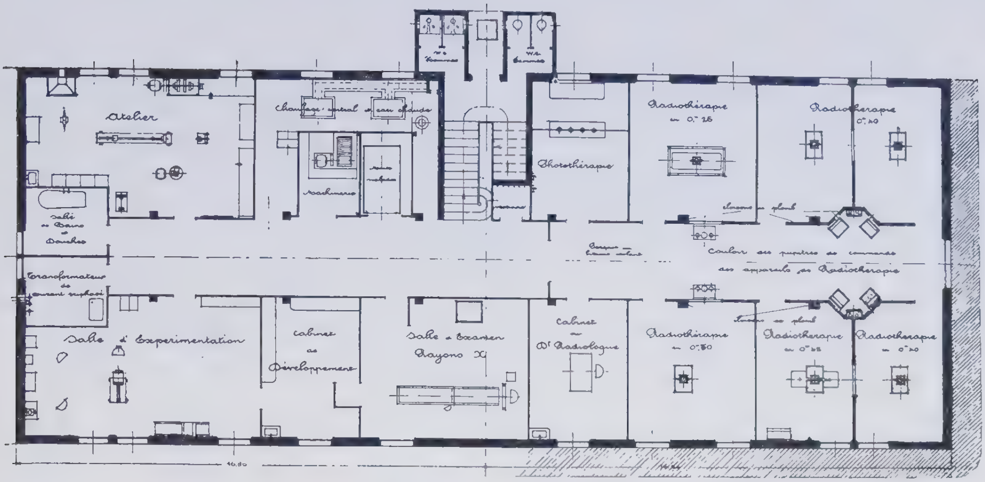

Fig. 2. Basement plan of Toulouse Center.

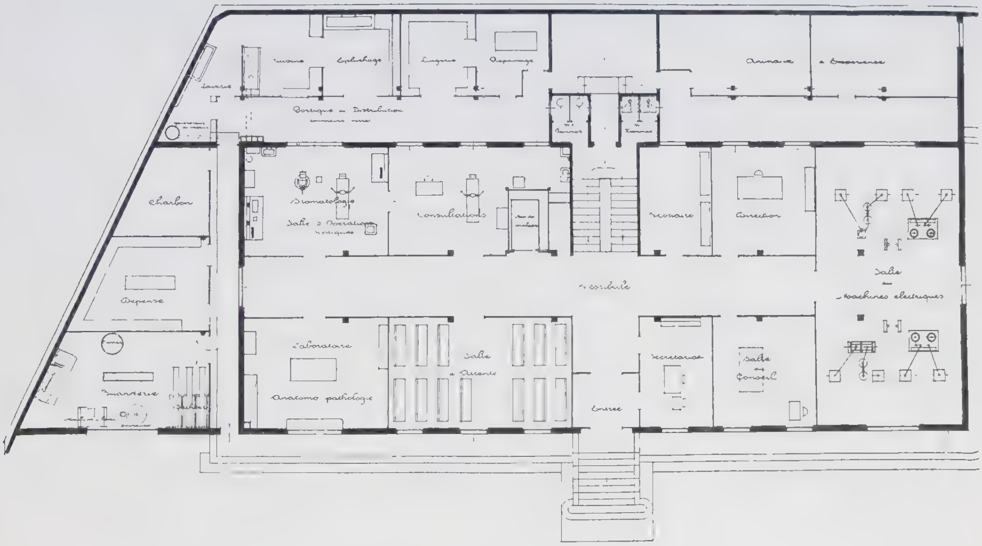

Fig. 3. Plan of ground floor, Toulouse Center.

of the new building, which are particularly organized for physical agents, are at the same time at the disposal of the chiefs-of-service of the hospital, because of the rather long distance from the site of the Faculty.

I believe that I have demonstrated the very great importance of the creation of special institutions, such as are constituted by the French anti-cancer centers, from a three-fold point of view, that of administration, diagnosis and prognosis, and treatment, as compared with independent organizations represented by Services of Public Aid, hospitals and laboratories of research, which function

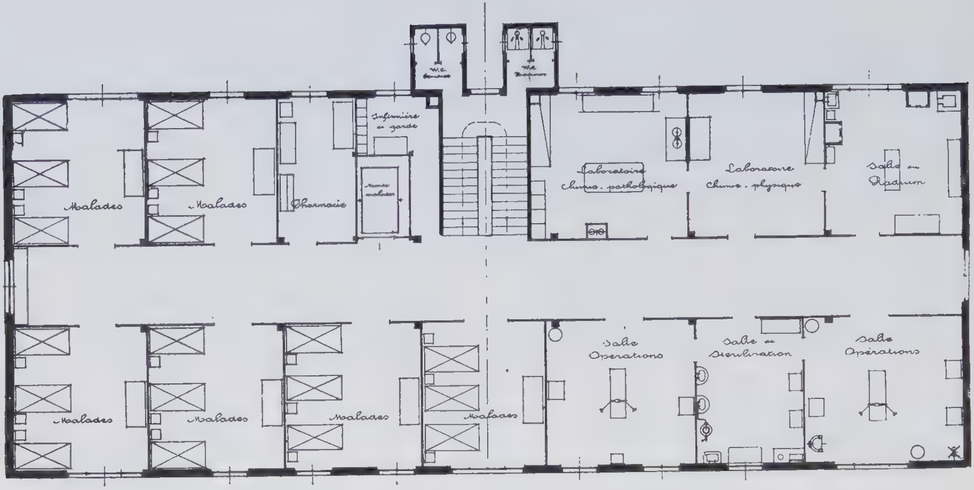

Fig. 4. Plan of first floor, Toulouse Center.

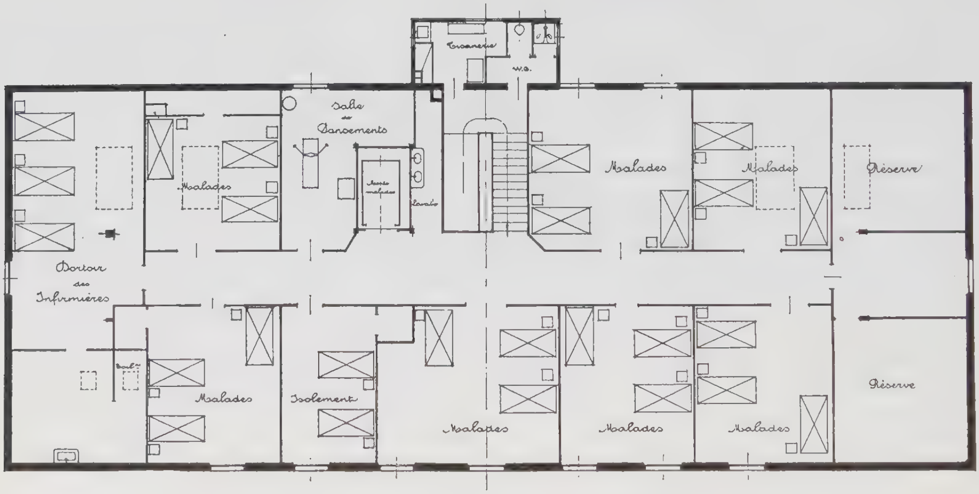

Fig. 5. Plan of second floor, Toulouse Center.

without strict co-ordination. What we have actually realized in France appears to me incomparably superior to the scattering of efforts, the disadvantages of which I have indicated in the first part of this paper and which is still the rule in many foreign countries.

EDUCATION OF THE PUBLIC

All that remains now is to examine a fourth question, namely, that of the instruction and education of the public, which in my opinion is no less important than the other three.

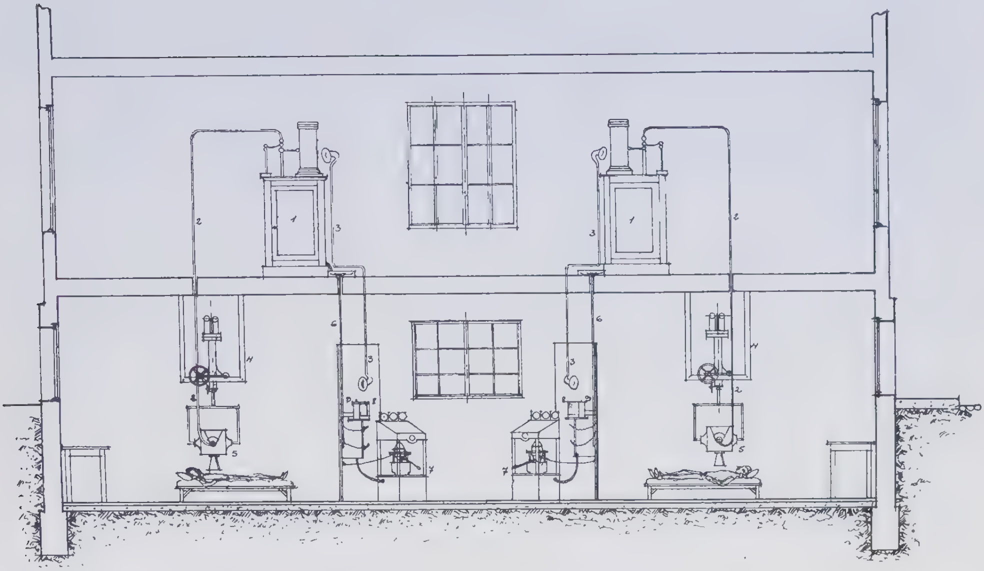

Fig. 6. Side view of Radiotherapy Department.

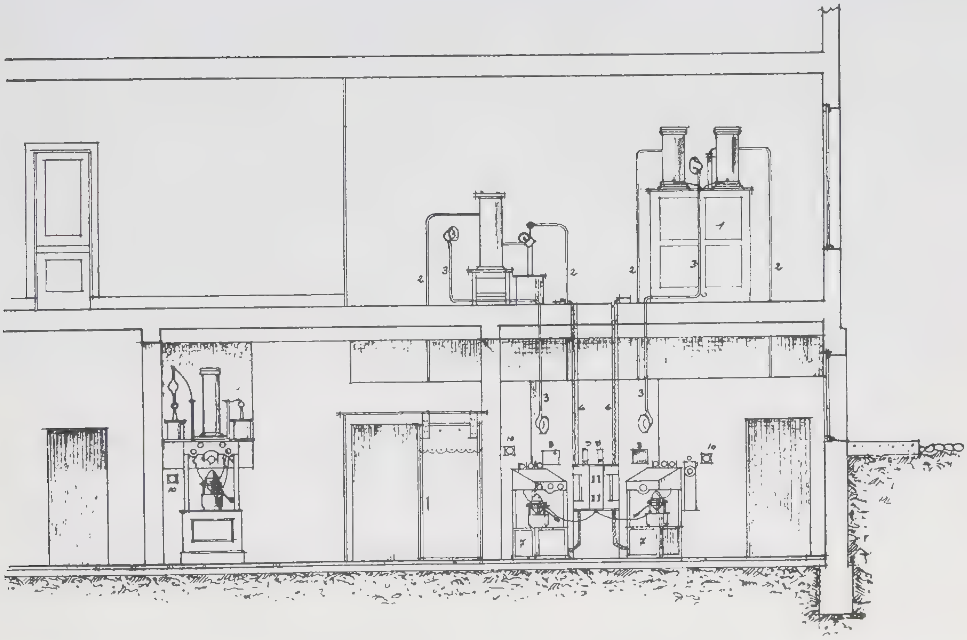

Fig. 7. Longitudinal view of Radiotherapy Department.

Following the creation of the Regional Anti-cancer Centers and as a direct result of their creation, the medical teaching was intensified and scientific researches and publications became more numerous. Professors of various ranks and the students under them had their attention drawn to this question of cancer, which has become one of first importance today. From this fact an immediate advance was realized, for our medical students of today are our *confrères* of tomorrow, who will a little later be able to spread abroad propaganda, because of the enthusiasm which youth shows in the presence of new scientific advances. But such education of the public as might be accomplished in this way by the instrumentality of new physicians could not produce appreciable results until too far in the future, and it is of great present-day importance to address ourselves directly to the public, to physicians already practicing, to the classes that mold public opinion, to the personnel of the teaching force of all grades, to college students, to the ministers of the churches, to all, in short, who are in a position to bring to bear an effective social influence upon the public, in order to help us overcome existing errors and prejudices with regard to cancer, as a result of which patients come to us for examination and treatment too late. Complete statistics of those who are sent to the Toulouse Center to be treated by radiation show that:

Thirty per cent are hopelessly incurable.

Forty per cent are already in a condition in which generalization has become more or less advanced, and against which we struggle only feebly when we employ powerful means of action to obtain improvement or, sometimes (but not often), a particularly difficult cure.

Finally, barely 30 per cent arrive in conditions that are favorable for effective treatment.

It is necessary to improve these numbers by every means possible and to bring it about that the patient shall consult his own doctor or shall present himself to specialists in the hospital for advice, the moment his fears begin. If the proportion of patients treated at the beginning of their disease were greater, there would be a twofold happy result: (1) a higher percentage of cures; (2) the possibility of treating effectively a larger number of patients for the same amount of effort and expense.

For example, a patient who at the beginning of his disease requires only a few milligrams of radium for his cure needs hundreds of milligrams a little later to secure a problematic result. This question of educating the public, in order to enable them to understand the importance which attaches to early treatment, is at least as urgent as the question of increasing the efficacy of modes of treatment. To be able to treat a patient in all phases of his disease is always desirable, but it is of much greater importance for the public welfare that the patient shall be able to receive treatment at the beginning of his disease when cure is more easily possible. This is truer of cancer than of any other disease. Cancer always begins as a local disease and its size increases only with time; the local appearance is often preceded by a special condition, the precancerous state, when cure is still easier. It is necessary, therefore, to act upon the public by all possible means and to make them understand its importance. The means are numerous and include posters, newspaper articles—especially in papers of wide circulation—pamphlets, meetings and, best of all, information sent to practicing physicians.

At Toulouse I have already employed all these means. It has seemed to me that the conference, organized with great care, was the most effective. In the round of conferences that I hold every year in the region around Toulouse I arrange in every case the following preliminaries: I have an understanding with the Prefect, who invites all the administrative authorities, and with the Superintendent of Schools, who invites the teaching personnel of both primary and secondary schools, the pupils of high schools (lyceums, colleges, and normal schools, for both sexes, the older pupils of the primary classes, etc.), and finally the ministers of the churches. Our meeting is thus attended by an audience of some five or six hundred persons who have been carefully chosen and who are capable of spreading certain ideas with regard to cancer and of combating errors and prejudices. The public at large is also kept informed by items in the newspapers. At the same time I sent to all the mayors of the communes of the Department or district a considerable number of leaflets summing up the simple ideas that the public ought to be made familiar with. The fact that the mayors often ask me to send them more of these leaflets shows the efficacy of this last method. The results obtained in a very short time are quite encouraging.

For this fourth question of the education of the public, the necessity for which is shown by daily observation, the only force that can act effectively and rapidly is a special institution, closely co-ordinated with the administrative authorities of the whole region and also with the service of public medical aid, and having by its university connections a direct influence upon the personnel teaching the various grades. Separate hospitals and research laboratories cannot have at their disposal these same means of activity, which can alone assure success.

CONCLUSIONS

From the four points of view examined in this paper—those of *Administration*, *Investigation*, *Treatment*, and *Public Education*—the creation of special institutions organized for the anti-cancer campaign should, and will, give results that are incomparably superior to those of the more scattered efforts hitherto put forth.

DISCUSSION

Dr. Howard Lilienthal, New York City: Merely to make an opening for discussion I should like to say how tremendously impressed I was by these papers. It is interesting to note that they are much alike in their manner of dealing with some of the methods of attacking the disease from the sociological side. A single point in the last paper, that of Prof. Marie, which particularly impressed me was the unqualified assumption that radium will cure cancer. I do not know whether we should all subscribe to that, but I was surprised to hear him make the statement so frankly.

Hon. Bird S. Coler, New York City: Forty years ago on the site of this room I spent a summer with my mother who was dying of cancer. At that time it was my high resolve that if the opportunity ever came for me to do something to lessen the incidence or mitigate the suffering of the victims of this disease, I would give my best effort. This last paper brings the whole thing to the crux.

Some years ago I was placed in control of the public hospitals of New York City and I found that the great City of New York, with a large number of indigent cancer cases, had no organized plan for caring for them. The cancer patients were being shipped to the House of Calvary, and to other religious institutions for incurable cancer, to die. We organized an institution for the care of these patients, and so far as the City of New York is concerned we are prepared to care for every cancer case. We have 300 beds always ready, and from 200 to 300 more beds available in case of need. We have an appropriation of over $100,000 a year for the needs of the New York Cancer Institute.

But the point I want to make in this discussion is what Sir John Bland-Sutton said, and what Dr. Mayo brought to my attention some years ago, namely, the necessity of providing opportunities for the study of the cancer problem to scientific workers. So we have equipped a laboratory and we feel certain we can obtain all the money needed for the conduct of scientific cancer research. We are in a position to offer these facilities to any scientific investigator in the United States or abroad whose problem appears satisfactory to our scientific committee. This committee represents the medical faculty of New York University. Our institution is supported not only by the municipality of the City of New York but also by the State of New York. We do not care who the investigators are who make discoveries in cancer. We want to offer our help to all of them. This is an institution of co-ordinated work which we have established so that we can co-operate with other workers and they with us, and anything we have we shall be glad to share with them.

Dr. Charles J. Hastings, Toronto: I have listened with intense interest to the papers presented and the discussions in connection therewith. The facts as revealed clearly demonstrate that we are yet limited in our efforts in the control of cancer to early diagnosis and early treatment—if possible, while the condition is still local, preferably in the precancerous stage. Obviously this can be accomplished only by educating the public to look with suspicion upon all abnormal conditions that years of experience have demonstrated are likely to develop into cancer.

This education, in my judgment, can best be accomplished by whole-time medical officers of health or commissioners of health, inasmuch as the public clearly understands that they have no ulterior motive; that they are interested only in safeguarding the public against unnecessary disease and death. It is well to bear in mind that the uninformed public, or shall I say the more illiterate, become somewhat skeptical when the surgeon or the radiologist publicly advocates early operation or early treatment by radium or X-ray for these abnormal conditions. One frequently hears them say that all the surgeon can see is an operation, and that the same is true to a greater or lesser degree with the radiologist.

On the other hand, the medical officer of health or the commissioner of health can weave this information into his general educational campaign, having it constitute one of the as yet uncontrolled group of diseases of middle life, such as chronic heart disease, chronic Bright's disease, or premature hardening of the arteries, for all of which we strongly advocate a complete physical examination, including X-ray, once a year for all over 35 years of age, and twice a year for those over 50 years. These complete physical examinations would no doubt reveal any abnormal condition on the surface of the body or internally, and would give the examining physician an opportunity to recommend immediate treatment, with the almost positive assurance of a permanent cure.

We are being repeatedly reminded that our failures to reach our objective in preventive medicine have been due, in a great measure, to our not having started soon enough.

As an illustration of our having failed, in a measure at least, by our not having started soon enough, there is, first, our experience in endeavoring to control infant mortality. We made fairly rapid strides for a while, and then we came to a standstill, notwithstanding the fact that we had as yet a lamentably high mortality, and it is only within recent years that we have awakened to the fact that most of the infants who have died during the first year, have died in the first month of that year, and most of those in the first week, and that the cause of their death was for the most part inefficient prenatal care, or improper care and guidance of the prospective mother.

Then again, in the case of tuberculosis, in our early experience with this, we were confronted with difficulties similar to those in our endeavor to control the mortality from cancer. By the early recognition of tuberculosis we have been able to enormously reduce the mortality from that disease. We shall also be able very largely to reduce the mortality from cancer when we are able to get in contact with these cases while they are still a local condition—if possible, in the precancerous stage. But the public must be informed, the public must be assured of the fact that cancer is not hereditary, that it is not communicable, and that, so far as we know, it is not due to any specific germ or virus.

This matter of education is not so simple as it might seem. You will probably recall that some twenty years ago, when the problem of education was being discussed in the Academy of Medicine in New York, Sir William Osler said that in his opinion the secret was "reiteration, reiteration, reiteration," to which one of his colleagues added, "without irritation." This is an art—to be able to repeat over and over again the same thing to the public in just a little different language.

Reference has been made to the danger of developing a "cancerphobia," the dangers of alarming the public. I think that in many cases it is absolutely essential to alarm the public. History has taught us that nothing but a calamity or an impending calamity will arouse man, individually or collectively, to a sense of his duty. I should be very glad to be able to produce a "cancerphobia" if every person, on recognizing that he had any abnormal condition, any abnormal growth, or other danger signal, would immediately consult his family physician, fearing that he had cancer. It would be the means of saving very many lives from this dread scourge.

DR. A. C. STRACHAUER, Minneapolis: With reference to the problem of the education of the medical profession, the Memorial Cancer Institute at the University of Minnesota is prepared to publish a monthly bulletin which is to be sent gratis to all physicians of the states of Minnesota, North Dakota and South Dakota. We intend to print information pertaining to the early recognition and proper treatment of cancer. The simple methods of examining patients will be described as well as the more complicated procedures. Important cancer literature will be abstracted and abstracts of our own cases presented. Reproductions of photographs and photomicrographs and comments by clinicians and pathologists also will be included. Funds have been appropriated by the Citizens' Aid Society, of Minneapolis, for the support of these activities.

It is my opinion that if cancer institutes the country over could be established and made the centers for education of their respective communities, along the lines stated, much good could be accomplished.

PROF. T. MARIE, Toulouse (Dr. Lenz, interpreter): Professor Marie wishes to clarify the phrase "cures by radium" which he used in his paper and to which Dr. Lilienthal takes exception.

There are two considerations which have a bearing upon this problem. The first depends upon the education of the public on the question of cancer. Education in this direction causes cancer patients to seek medical advice early. This results in a greater number of early cases, and therefore a greater number of cures. Again, for early cases, less radium is needed than for late cases, and an institution can efficiently treat more early cases with the same quantity of radium than cases which arrive later in the course of the disease. All these factors help to raise the total percentage of cures.

Second, the differentiation must be made between cases which are localized and those which have begun to become generalized. In the first group a great number of cures may be expected. In the second amelioration may be hoped for and an occasional cure may occur. A destructive radiation intensity must reach each individual cancer cell, for otherwise the growth of the cancer may begin again. At the same time this radiation intensity must be so small as to affect the normal surrounding tissue as little as possible, as this tissue later has to take up the task of regeneration and replacement of the parts destroyed by the radiation. The measurement of radiation intensities at various points of the body has been described in detail in a paper which will be published later.

DR. ISAAC LEVIN, New York City: As a man who follows the work on cancer research and control throughout the world, I was aware of the fact that France leads the world in cancer control. The reasons for it are the following: In the first place, France has very wonderful surgeons. I remember how as a young surgeon, thirty years ago, I admired the work of Dr. Hartmann, who read a paper this morning. A second reason for the advanced position held by France is that radium was discovered in France and radium therapy was begun and developed in France. There is no one working in cancer who can fail to be filled with respect and admiration for Bergonié, who died a martyr to science. His system as to the organization of cancer centers is ideal. The more of those centers there are built and organized the better, and France is not able to build a single one today. All they need today is money. I therefore submit to the American Society for the Control of Cancer, which is doing a great work, whether it would not be a good idea to join the resources of the world and create innumerable cancer institutes as Bergonié has visualized them. I believe that then the cancer problem would come near solution.

DR. J. SHELTON HORSLEY, Richmond, Virginia: Like everyone else here I admire these excellent papers. They have been not only interesting but stimulating.

One point in the public education for control of cancer has not been touched upon, and it is quite important. It is this: What shall be the attitude of a person who treats a patient with cancer toward telling the patient whether or not he has cancer? It seems to me that the education of the public on the subject of cancer is dependent to a large extent upon the information imparted to the patient by the surgeon or radiologist who treats the case.

Dr. Richard Cabot of Boston advocates, as a result of his observations, the practice of telling the patient the truth in every instance. This of course can be done optimistically, so as not to take away all hope. Then again there is no necessity of ramming brutal truths down the throat of a patient who does not wish to hear them. In such instances nothing need be said.

I should like very much to have an expression of opinion about the proper policy to be adopted in this matter. Personally, I have always made a practice of telling the patient the facts if the patient desires to know them, but doing it as hopefully as I could. Not infrequently a woman suffering with cancer of the breast will appear with her daughter. The daughter often makes the request that her mother be not told that she has cancer, insisting that the shock will affect her mother profoundly. If the matter is discussed fully and in a common sense way the mother, in my experience, is usually grateful for the information. But suppose she were deceived and the daughter developed a lump in her own breast. The daughter could have no confidence in a surgeon who had made false statements to her mother. In this way the whole scheme of confidence and trust between the patient and the medical profession would be undermined, and the old tradition that doctors or nurses will readily tell "white lies" would be perpetuated to the detriment of the public health and welfare.

Prof. J. Maisin, Louvain: In Louvain, where we have a cancer institute, a vast number of people come to us to be treated. Thus it seems to us that the patients are not afraid of the word "cancer." It may be best not to tell the patient the first time you see him that he has cancer.

We are treating in our institute every kind of cancer, of course, but beside cancer patients we accept patients with fibroma, angioma, Basedow's disease, and a few other types of disease suitable for treatment by radiations. The majority of these patients will be cured. The same thing is true for many types of early cancer.

So the patients realize that cancer is not always an incurable disease and we are not afraid to use the name "cancer" for our institute or even to tell a patient he or she has cancer.

Dr. Francis Carter Wood, New York City: One point not brought out in the papers is the opportunity the cancer centers give for education of the local profession. Dr. Marie took that point up by saying that the local physician was always welcome at the conferences held in the hospital. That offers an opportunity for the man who is no longer a student and has little time for post-graduate study to be further instructed and taught what he must do—that he must not delay after making a diagnosis and that he must be willing to send these patients where they can get proper attention. The thorough education of the general practitioner in the diagnosis of cancer is a great problem, the surface of which has not yet been touched.

THE CAMPAIGN AGAINST CANCER IN SWITZERLAND

By Professor CHARLES DUBOIS, Geneva, Switzerland
President, National Swiss League against Cancer; Director, Dermatological Clinic, University of Geneva

SWITZERLAND has the sad privilege of ranking second among countries of which the statistics are known in its number of deaths from cancer.

The extent of the ravages produced in our little country by this terrible disease has been set forth in the works of Dr. Carrière, director of the Federal Hygiene Service at Berne. By statistics covering a period of 20 years, from 1901 to 1920, and comprising a total of 89,820 deaths, he has shown that for our population of about 4,000,000 individuals the average number of deaths from cancer per annum reaches the enormous figure of 4,500.

In the absence of statistics of morbidity these mortality statistics have an incontestable value from the fact that in Switzerland an overwhelming majority of the deaths are made the subject of a very careful medical verification.

After infant mortality and deaths from tuberculosis, the mortality from cancer occupies the third place, the victims being struck down at just the age when they can render the maximum of service to society.

One of the first facts to emerge from Dr. Carrière's studies is the unexpected finding that in Switzerland the frequency of cancer has not changed sensibly in 20 years. The mortality has not varied in more than trifling proportions, remaining practically constant at 12.1 per 10,000 inhabitants (Fig. 1).

If the curve has not been modified by the assured decrease of mortality from cancer under the influence of modern therapeutic progress, it is because diagnosis has become much more exact and the verification of deaths from cancer much more precise. These two phenomena affect one another, and the increase of cancer morbidity pointed out by some clinicians seems to be chiefly due to the fact that patients are better cared for than formerly.

CANCER INCIDENCE AND DISTRIBUTION

The incidence of cancer in Switzerland shows a clearly regional character which has been maintained unchanged during the 20 years studied and still remains so at the present time. Certain parts of the country are manifestly invaded to a greater extent than others, and accordingly the mortality of the northeast and central cantons is considerably higher than that of the cantons of the west and north.

As between the cities and the rural districts the number of cases shows no appreciable difference, but in some cases the statistics demonstrate that old quarters of a city are always more seriously affected than new ones.

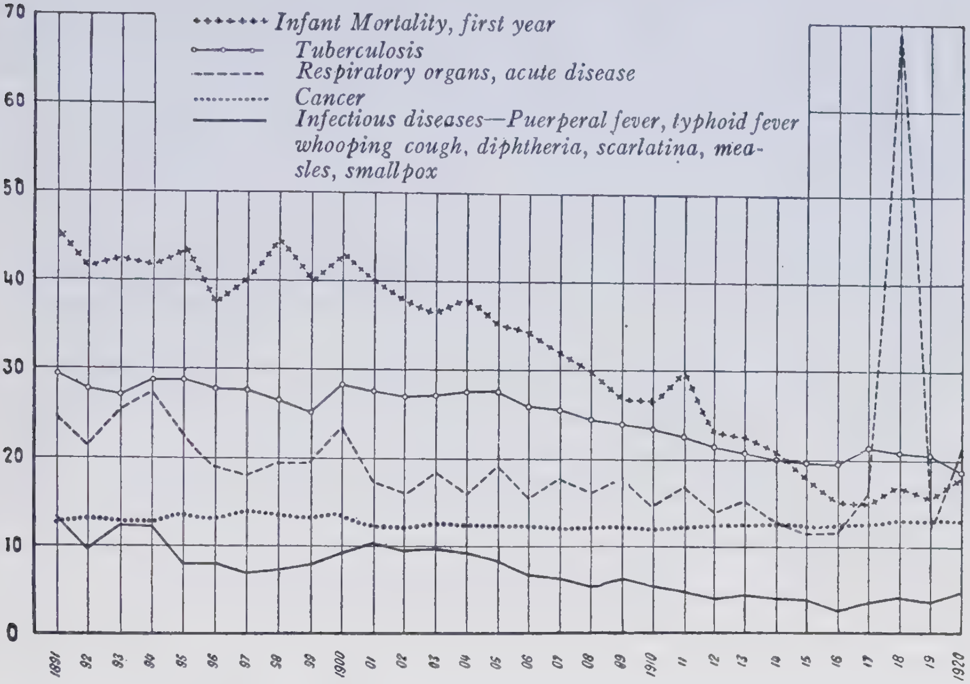

Fig. 1. Chart showing the comparative mortality from a number of diseases in Switzerland between the years 1891 and 1920. The abrupt ascent of the curve for diseases of the respiratory tract for 1918 is due to influenzal complications. These are figured here instead of with the infectious diseases.

Everyone knows that goiter is a prevalent disease in Switzerland. Now, the points of its maximum prevalence correspond with those of cancer to the extent of showing a certain parallelism which is worthy of study.

From the point of view of sex distribution the total mortality from cancer is the same, or nearly so, for the two sexes, and scarcely differs for man or for woman from the general figure for the country as a whole.

Up to the age of 50 the mortality is relatively higher among women, because cancers of the breast and of the uterus occur chiefly at the time of the menopause. From the age of 50 on, the proportions are reversed, for cancer of the stomach, which is much more common among men, seldom starts before that age.

Carrière's statistics also show that there is a displacement in the age of cancer death, with a marked increase of mortality in individuals who have passed the age of 69, as if people died later of cancer today than they did 20 years ago. Statistics of morbidity, on the other hand, seem to indicate that the disease attacks young subjects more frequently today than formerly.

If the question is studied from the standpoint of its localization, it is seen that cancer mortality in Switzerland is based chiefly on cancer of the digestive tract, including the tongue, rectum, liver, bile passages and pancreas. These localizations in fact constitute 75 per cent of the total cancer mortality, without any reason being assignable why there should be this special predilection which does not seem to exist in other countries. Cancer of the stomach alone represents more than five-ninths of the total.

Men are more subject than women to cancer of the digestive tract, which constitutes 80 per cent of male cancer mortality.

M. Carrière also points out the striking predominance of cancer of the tongue and larynx in the male sex. In this connection he raises the question of the possible influence of tobacco, and asks whether this proportion is likely to change as the use of tobacco becomes more general among women.

Cancers of the breast and of the uterus represent 27 per cent of the cancer death rate in the female sex. That of the breast is markedly on the increase of late years, with a maximum of mortality between the ages of 40 and 49.

Other localizations offer insignificant percentages which are almost evenly balanced in the two sexes.

FORMATION OF THE SWISS NATIONAL LEAGUE AGAINST CANCER

As it is possible to form an idea of conditions through this brief account based on figures, the situation in Switzerland with regard to cancer is seen to be quite alarming. Clinicians, sociologists, and philanthropists have not waited for the publication of Carrière's statistics to organize an energetic campaign against the terrible scourge.

In 1910 the Swiss National League against Cancer was established, to which anyone may belong who is interested in the question, on payment of a small annual subscription.

The object of this League is to encourage the scientific study of cancer, to wage a campaign against the disease, to give financial aid to needy sufferers from cancer, and to educate the people as to the nature of cancer and particularly as to the need of seeking treatment promptly.

The members of the League meet once a year in general assembly, in one or another of the cities of Switzerland. After all matters of business and administration have been attended to, a large meeting is held which is open and free to the public, at which some subject related to cancer is discussed, with reports as to the progress made in the study and treatment of this disease. These conferences are greatly appreciated by the people and always attract large crowds.

The League has a large amount of material for purposes of exhibit, including photographs, models, graphs and preparations, which constitute an important collection of data regarding cancer; these are placed at the disposal of the public at large, to make them understand the importance of paying attention to the very earliest symptoms and the value of early medical intervention. This exhibit is carried from one place to another, even into remote villages, and physicians who are members of the League accompany it to give explanations or to hold evening meetings in the same place, to which admission is always free.

This form of propaganda has met with criticism from certain timid souls who are afraid of developing an exaggerated fear of cancer in the community. It is our experience that this criticism is not well founded. If it has come about that some persons with an exaggerated nervous sensibility have become alarmed over an imaginary cancer and have needlessly rushed to doctors who have reassured them, there are many others who have received great benefit from early intervention, because their attention has been drawn to symptoms to which they had hitherto attached no importance.

Every year our traveling exhibit takes up its line of march with new success. Its collections are increased or made more complete by gifts or fresh acquisitions, and we are convinced that it constitutes one of the best means of popular education, for the only effective prophylaxis known at this time consists in ferreting out the disease while it is still definitely local.

The League takes no direct part in the treatment of patients, who find the necessary care for their condition in the numerous university or private clinics.

In 1914, after encouraging results had been observed from the application of radium in the treatment of tumors, a private society opened the Swiss Radium Institute S. A. in Geneva, and placed the radium in its possession at the disposal of the medical profession of Switzerland. For ten years this Institute has been the only effective organization for combating cancer by radium. Thanks to the efficiency of its Director, Dr. Ph. Wassmer, and to its special methods of extraction and emanation, it has been able to do all that has been demanded of it.

As the technique of the use of radium has become more accurate, constantly demanding larger quantities of this precious element to assure better results, groups of persons have been formed in the principal university cities of Switzerland to acquire, with the financial support of the public, the radium which the State was not in a position to furnish to the country.

THE ANTI-CANCER CENTERS OF SWITZERLAND

These organizations in Switzerland correspond to the anti-cancer centers that have arisen all over Europe in recent years. The anti-cancer centers of our university cities co-ordinate their efforts with those of the National League. They compile regional statistics of morbidity, organize propaganda in their respective territory, and above all advocate practical activity in the treatment of cancer.

The anti-cancer centers are at the disposal of patients and physicians, first, for the pathologic examinations necessary for diagnosis; second, for the purpose of giving advice and even of directing therapeutic operations, and third, in order to furnish the radio-active material necessary when this form of treatment is required. They direct needy cancer patients to such hospital clinics as are open to them, and, in the case of patients in better circumstances, place at the disposal of the physicians treating them the means indispensable for the care which their condition demands.

If we have no special hospitals for cancer patients it is because our university clinics, whose number is large for our small country, possess a surgical and X-ray equipment sufficient for the needs of all.

To sum up, the organization for the campaign against cancer in Switzerland is made up of two great pieces of machinery. One is the National League, the organ of general education, which is trying to instruct the whole country, subsidizing research and co-ordinating separate efforts. The other consists of the regional anti-cancer centers, organizations for scientific research and treatment, working in close collaboration with the university hospital services.

Though this organization at first glance appears rather complete, a good many things are lacking. The amount of radium available is still insufficient; the equipment for research could be developed further; the expense of treatment for the poor exceeds the resources at hand, and the education of the medical profession in matters of cancer therapy is incomplete.

It is not enough that every doctor should have at hand the elements necessary for the treatment of cancer, to obtain sure results by their application. Oncology has become a special branch of medicine which should be taught on the same basis as other specialties, for nothing but a thorough study along this line will make possible the realization of the hopes to which the application of modern treatment has given birth.

We have often heard physicians speak slightingly of radium because they had not obtained by its use the results on which they counted. These men never stopped to ask whether their own mode of application had been a rational one.

Anti-cancer centers which, like ours, do not directly treat patients ought to add to their activities the education of the medical body in the field of oncology.

However, the effort Switzerland has made to take part in the great movement of cancer control has exceeded the expectation of all who are actively engaged in it. The entire nation is interested in the question, and the daily press gives out information frequently with regard to the news about cancer.

If the day arrives when a specific is discovered, it will come to pass with cancer, as it apparently has with syphilis, that its occurrence will be exceptional, and recourse will have to be had to treatises to find out what the disease has been.

The campaign against syphilis has been as relentlessly waged among us as that against cancer, and if the results are such that we have scarcely any more syphilis in Switzerland, this is due not only to the fact that the means of destroying its causative agent have been placed within the reach of all but also to the fact that education of the people is intensively carried out among all classes of society and persons of all ages, so to speak.

Let us hope that the activity that is being displayed against cancer throughout the world will bring about a similar result.

MORBIDITY STATISTICS OF THE ANTI-CANCER CENTER AT GENEVA

By Dr. ALBERT REVERDIN, Geneva, Switzerland
Treasurer and General Secretary, Anti-Cancer Center of Geneva

PROFESSOR DuBOIS was detained at Geneva at the last moment by the precarious health of his father, who is 86 years of age. He has begged me to tell you of his very great regret that he is not able to respond to your flattering invitation, and has charged me to express to you his warm sense of gratitude. In his paper, which has been read to you, he speaks in the name of the Swiss League against Cancer and tells you of the results that have been obtained in all classes of cancer patients.

If we are taking these steps it is because we must not deceive ourselves: not more than a fraction of the total number of cancer patients arrive in the hands of any of the specialists, and these are generally among the most advanced cases, or, what amounts to the same thing, they are those in whom treatment has failed, and who have now passed beyond the favorable time that precedes generalization.

We hope very soon, therefore, to be able to demonstrate that cancer patients should, as soon as their disease is recognized, be turned over immediately to specialists who will treat them in institutions specialized for the purpose.

You have paid me a great honor in inviting me to take part in your labors; I realize the weight of my responsibility and desire to express to you my full appreciation.

It is in the name of the Anti-Cancer Center of Geneva that I come to you with some suggestions.

Permit me first of all to draw your attention to two or three points in Dr. DuBois' paper.

A professor of pathologic anatomy of Zurich claimed that he had never performed an autopsy on a person of Swiss origin without finding in him a condition of thyroid degeneration; this will show you to what an extent goiter prevails in our country.

The Central Bureau of Statistics shows us that the number of cancers increases *pari passu* with the number of goiters; that is to say, the regions of our country that have the most goiter are likewise the regions where cancer is most prevalent. On the other hand, you know that in Switzerland the treatment of goiter begins officially in the schools, where iodized salt is administered to the children, with very successful results. As a consequence of this the hope is naturally aroused that we may perhaps succeed in decreasing the number of cancers, if the one condition depends upon the other.

In Switzerland, as everywhere, women are using tobacco to an immoderate degree. Since syphilis is becoming a rare disease, it will be easy in a few years to know whether cancers of the tongue and larynx have their origin in the chronic irritation caused by tobacco.

We have established the fact of a noteworthy increase in the percentage of mortality from cancer in aged persons; this is the objective proof of the words spoken by Sir Paget, which were recalled to us yesterday afternoon by our eminent *confrère*, Sir John Bland-Sutton.

Allow me to assure you that the statistics of Dr. Carrière, director of the Federal Service of Public Health, have been established with scrupulous exactitude and subjected to careful study. Every doctor is required to answer with precision a large number of questions, especially inquiries relating to tumors.

There is no doctor worthy of the name who does not make use of all possible means of investigation which science offers him in order to reach a precise diagnosis of the lesions which he observes, and everyone aids him to the utmost, but unfortunately all statistics are based only on the mortality! Therefore, to complete their data we have thought it wise at the Anti-Cancer Center of Geneva to collect statistics as exact as possible with regard to the cancer morbidity of the Canton of Geneva.

We have begun to educate the public through a large number of meetings held in all parts of the canton and have used all possible means of propaganda: moving pictures, lantern slides, and, especially, newspapers in order to keep all classes of the population informed, giving the name of cancer plainly to every case that is cancer. Then we have given cancer instruction to nurses, visiting nurses, and midwives, especially the latter, since these are very often called in place of a doctor; finally, we have been educating our 250 doctors, emphasizing the fact that we are trying to learn the total number of tumors in course of development, and the kind of treatment applied to each, among the 150,000 inhabitants of the Canton of Geneva, and asking them to help us by all means within their reach.

In this way we hope to be able to recognize as exactly as possible the total number of tumors treated, the kind of treatment, and the results obtained in all cases. After having gathered true statistics of cancer morbidity we shall have such a picture of the situation as the mortality statistics can furnish only imperfectly. We then hope to be able to demonstrate promptly that the cancer patient, from the moment he is recognized as such, must be entrusted at once to the care of specialists who will treat him in institutions specially designed for this purpose.

THE ANTI-CANCER CAMPAIGN IN BELGIUM

By Professor J. MAISIN, Louvain, Belgium
Professor, University of Louvain; Director, Cancer Institute of University of Louvain

THE official organization of the campaign against cancer in Belgium dates from the time of the creation of the Cancer Commission. This was established by royal order before the war and is composed of twenty members chosen from the universities, from the State laboratories, or from among distinguished representatives of private medical practice.

Part I.—The Organization of the Anti-Cancer Campaign

Before the war the activity of the Commission was limited to publication on the subject of cancer, the distribution of these among the medical profession and the public, and the granting of certain subsidies to research workers. After the war, when the problem of cancer had become one of the most pressing, the Commission worked out a program for a campaign against cancer. It decided to grant a subsidy of 1,000,000 francs to be divided among the anti-cancer centers. It was also decided to create four principal centers, one of these to be organized by each of the four universities of the country. In addition, the Commission determined to make grants, when necessary, to private organizations worthy of interest. The granting of the subsidy of 1,000,000 francs to the anti-cancer centers was voted by the Government in 1924, upon the following conditions:

The anti-cancer center must undertake the work of educating the people, of giving assistance, and, especially, of promoting treatment. Each center must be equipped with at least (*a*) a complete surgical service with facilities for consultation for cancer patients, (*b*) an installation of machines for deep X-ray therapy, consisting of at least two pieces of apparatus with a minimum capacity of at least 200 kilovolts, (*c*) an amount of radium element not less than 500 milligrams, and (*d*) a laboratory where research work, examinations, and the necessary analyses for diagnosis and treatment shall be carried out.

THE RELATION OF THE CENTERS TO THE STATE

The annual amount granted to each anti-cancer center is not fixed; it varies from year to year and depends upon the activity and needs of the center. At the beginning of October of each year, each center files a report accompanied by its request for subsidies. During the year the centers are subject to the control of the State through the intermediary of the State Medical Inspector. This control is directed only to the material side of the institution and is not concerned with the methods of treatment, the choice of which is left wholly to the medical direction of the center.

This subsidy of the State is granted to defray the expenses of *treatment* alone. The expense of *hospitalization* is charged, as in the case of other kinds of patients, to the communes, to fraternal institutions or mutual benefit societies, or to the patients themselves. It is evident that only indigent patients or those with very slender resources can receive the benefit of these treatments at the reduced prices which are rendered possible by State subsidies.

In addition to the State aid in the form of an annual subsidy, the Mining Union of Haut Katanga (a Belgian radium concern) has granted permission to each of the four Belgian universities, which are the seats of the anti-cancer centers, to borrow from it 2 grams of radium bromide at the rate of 30,000 francs yearly per gram. In this way each anti-cancer center has at its disposal 2 grams of radium bromide at a relatively low expense; 250 milligrams of this radium must always be reserved for scientific research and the remaining 1,750 milligrams is available for treatment.

THE RELATION OF THE CENTERS TO THE UNIVERSITIES

During the scholastic year 1923–24 each one of the universities, in accepting the grants accruing to the anti-cancer centers, makes itself responsible for the organization of these centers. While observing the general rules laid down by the Cancer Commission and by the Minister of Public Health, each university organizes its center according to its own ideas.

A. The two state universities, that at Liège and that at Ghent, have established their centers in accordance with practically the same principles and along the same lines.

The following account will give some idea of how the center at Ghent is organized (the details of which have been furnished by its general secretary).

The anti-cancer center forms an association without any money-making object, which receives its maintenance from an annual appropriation made by the Government, a grant from the province, one from the city, aid from the university, and the loan of radium from the Belgian radium concern mentioned above.

The Commission of Hospitals of the city places at the disposal of the anti-cancer center 30 beds distributed among the different services and assures the maintenance of the patients.

Each university chief-of-service is chief-of-service of the anti-cancer center in the specialty corresponding to his own (general surgery, gynecology, urology, etc.).

Three beds are reserved for cases which the pathologist can treat directly, without intervention of any particular clinic. Two beds are reserved for vaccination treatments.

Each chief-of-service decides for himself what treatment shall be given to cases of cancer belonging within his own specialty. The radiologist is consulted when the treatment is to be by radium or X-rays.

The keeping of the records of the names and addresses of the patients treated is centralized under the service of pathological anatomy for the sake of statistics later on.

The organization at the University of Liège is very similar. It must be noted that Liège possesses three pieces of apparatus for deep X-ray therapy which have a capacity of over 200 kilovolts.

In my opinion what is regrettable at these two centers is the fact that there is no single head whose duty it is to direct the work and centralize efforts. Furthermore, they are centers with no local cancer staff, because the patients are scattered about in different services.

B. The two free Universities of Brussels and Louvain have made an effort toward greater centralization.

Brussels has adopted the following organization:

The buildings and the hospitalization of patients are in the care of the hospitals of the city. The center has a certain number of beds, a service of surgery, one of radium therapy, one of X-ray therapy, and a laboratory, all of which are assembled in the buildings which compose the anti-cancer center. The center is directed by a group of three chiefs-of-service—a surgeon, a radiologist, and a pathologist.

At Louvain the University itself has charge of the whole organization with the aid of official grants and help from private philanthropy. The University has appointed me director of the Cancer Institute of Louvain, which is the seat of the anti-cancer center. The director has associated with him a radiologist, a biologist, an expert in physicochemistry, and a surgeon for routine surgical treatment. Every time the need arises he calls in as surgeon the chief-of-service of some one of the great surgical specialties of the University. Finally, it goes without saying that the institute has attached to it a variable number of free assistants, internes, and laboratory workers.

DETAILS OF THE CANCER INSTITUTE AT LOUVAIN

In creating the Cancer Institute it was the wish of the University of Louvain to enter upon the campaign against cancer with the help of three important branches: the medical teaching of cancer, the treatment of cancer, and laboratory research work on the subject of cancer. In the Cancer Institute, therefore, cancer patients are treated and receive hospital care, laboratory studies are made in all fields of oncology, and courses in oncology are given to medical students.

The following account shows how the material equipment of the Institute has been realized, which is already partially functioning and will be completed in the spring of 1927. For the orientation and general planning of the buildings we have had to take account of the shape of the land at our disposal. The plans and construction work were made by Canon J. Janssens, inspector of material of the University. These plans were drawn according to my directions and were based on the results of the visits I had made to various foreign institutes in America, Denmark, and France.

The ensemble of the buildings is in the form of the letter T with one additional ell placed at the side of the end of the long arm of the T. The small arm of the T contains on the ground floor: (1) The rooms for X-ray machines where all the high-tension generators are centralized, including those used for diagnosis. By means of high-tension trolleys, the generators deliver the current both to the room for X-ray diagnosis, situated on the same floor, and to the four rooms for deep X-ray therapy situated immediately above the room where the machines are. (2) The waiting rooms and examining rooms for patients, and a bursar's office for this pavilion. (3) The autopsy rooms, which are in a compartment completely isolated from the others. One of these autopsy rooms is arranged for giving practical demonstration to students.

On the first floor we have: (1) Four rooms for deep X-ray therapy leading from a single hall. These rooms are veritable boxes of lead, lined on five of their walls with a double layer of lead 0.5 cm. thick. They communicate by means of sliding doors with the hall where the manipulation is made; these doors are also leaded (1 cm.) and contain lead glass observation windows. The one wall of the irradiation room that is not leaded is pierced by windows and looks out upon the river and gardens. (2) The laboratory for the manipulation of radium. (3) The room for the ultraviolet ray apparatus. (4) The dressing-rooms for the patients.

In the basement are rooms for the various experimental animals, the cuisine and operating-room for animals, and a cold room for cadavers.

The long arm of the T contains on the ground floor the research laboratories, the rooms for theoretical and practical courses, the museum of pathological specimens and graphic records of oncology, and the library of the Institute. On the first floor and communicating readily with the rooms for deep X-ray therapy and the laboratory for the manipulation of radium are found the operating rooms for radium therapy, and rooms for endoscopy, anæsthesia, and sterilization. All these rooms are grouped together at the end of the long arm of the T where it meets the small arm. The rest of the floor is occupied by separate rooms designed for the hospitalization of patients and for their comfort. On the second floor we have placed small open wards for patients as well as a certain number of private rooms for patients, and rooms for the interne and for dressings. The roofs of the buildings are flat and serve as promenades for the patients. They have sheltered enclosures for use in inclement weather. In the basement are the kitchen, the laundry, the central heating plant, and the workshop for routine repairs of the various forms of apparatus. The various floors and roofs are served by elevators.

The ell at the long arm of the T has in its basement the central installations for electricity, water and gas, and the garage. On the ground floor are the administration and consultation rooms and on the first and second floors rooms for patients.

OTHER PROVISIONS FOR THE CARE OF CANCER PATIENTS

Finally, in concluding the account of the anti-cancer hospital organizations in Belgium, I should mention the existence of Calvary, an institution located in Brussels, for incurable cancer patients. This institution, supported partly by the State and partly by charity, receives cancer patients for whom no curative treatment is any longer possible.

There is also in our country an insurance company, Providentia, whose members, for a small annual payment, have all the expense of treatment and hospitalization paid from the time they begin to suffer with a cancerous disease. A patient who is a member of this society has the privilege of choosing his own physician. The society has its headquarters in Antwerp.

PART II.—CANCER RESEARCH AT THE LOUVAIN CENTER

Having rapidly reviewed what has been done among us in the field of the anticancer campaign, I may perhaps be permitted to tell with what subjects our scientific studies have been concerned at Louvain.

I. In further pursuit of investigations on a subject which we began in the laboratories of Dr. Murphy at the Rockefeller Institute in New York, we have sought to find out whether tar cancer is simply a cancer from local irritations.

It seems logical to assume that there exist for cancer as for other diseases general factors of predisposition and resistance that vary with the individual, the genus, and the species. The existence of these factors, the nature of which is unknown, has been demonstrated by J. Fibiger for spiropterous cancer and by Bullock and Curtis for cysticercous sarcoma. These authors prove that there exists an immunity of the individual, the genus, and the species in the presence of the same cancer-producing agent, and that there is even a tissue immunity. On the other hand, the remarkable investigations of M. Slye, C. Lynch, and Strong prove that the receptivity to spontaneous cancer and to cancer transplantations behaves like an hereditary mendelian character. Now, tar cancer in the mouse apparently does not follow these laws: one obtains, in fact, 100 per cent of skin cancer in animals whose resistance is broken down by a sufficiently long painting with a coal tar strong in cancer-producing properties—and these are cancers which would not have occurred spontaneously. Now, it seems that in painting with coal tar one produces nothing more than a simple local irritation. Furthermore, the descendants of these animals which have developed cancer remain just as free from the development of spontaneous skin cancer. Upon reflection it is seen that, if 100 per cent of animals develop tar cancer, apparently through simple local irritation, this proves that one can with the help of certain substances render all the individuals of certain species receptive to one given type of cancer; one may, then, create artificially in a given individual a cancer receptivity which exists by heredity in others. If the descendants of these animals do not develop spontaneous cancer, this seems to prove that there has not been created an hereditary character (receptivity to cancer) but a modification in a given individual. This can be explained also on the ground that hereditary receptivity is not able by itself alone to cause the appearance of a cancer. In fact those mice which would spontaneously develop a cancer of the breast do not do so if their ovaries have been removed before puberty, for this suppresses the internal ovarian secretion which is necessary for the appearance of cancer in a mouse capable by heredity of developing cancer. Descendants of those mice which do develop tar cancer of the skin will not develop cancer in the absence of chronic local irritation of the skin, even if their organism was receptive.

Coming to the explanation of these results obtained by local irritation with coal tar, we have proved experimentally that coal tar has a twofold action: on the one hand, a very powerful local irritative action and, on the other, a general action whose nature is not known but is such as to render the animal receptive to cancer. This experiment has been made in two ways:

1. If a series of mice are painted with a cancer-producing coal tar for two months only, at a given point on the skin, only a small number of animals will develop cancer (10 to 20 per cent); but if a series of animals are painted at a given point for two months, and are then painted for another two months at another point far removed from the original one, a large number of animals will develop cancer (60 to 70 per cent).

2. If coal tar is injected under the skin of mice, these almost never develop tumor; the connective tissue does not become cancerous in mice by this method. Among 100 mice thus injected, we have not observed a single definite case of sarcoma. It is possible, therefore, to intoxicate mice with coal tar without making them cancerous.

If, now, coal tar is injected in small doses under the skin of the belly of a series of mice for four months, with great care not to soil the skin, and if, after this, the animals are painted on the back of the neck for two months, a large percentage of animals develop skin cancer upon the nape (about 70 per cent). The control animals that are not injected, but are only painted for two months on the nape, develop cancer in a much smaller proportion (10 to 20 per cent).

II. The general factors which combine to produce the appearance of cancer do not seem to be the same for all types of cancer. In fact, L. Loeb and M. Slye have shown that the removal of the ovaries before puberty from female mice which would spontaneously develop cancer of the breast always prevents the development of this cancer. Similarly, in another field of work, Strong has proved that castration before puberty renders mice refractory to cancer implantation. Now, we have castrated mice before puberty and after puberty, both males and females; then after about three months we have painted them with coal tar. All these mice develop tar cancer just as readily as the non-castrated controls. Furthermore, the castrated males seem to develop metastases more readily than the control mice (72 per cent of castrated mice, 33 per cent of controls). These results have led us to investigate the action of the various functions of the genital glands upon the evolution of tar cancer as well as the influence of other endocrine glands. These studies are not yet completed.

III. When receptivity for a given type of cancer exists in an animal, a chronic common irritation is capable of provoking cancer. Kazama and Leitch have proved this, the latter by producing cancer of the gall bladder in certain guinea pigs, through the surgical introduction of small aseptic pebbles into that organ. We have continued studies of the same kind in rats, by trying to provoke cancer of the bladder by the introduction of various kinds of substances. In this way we have been able to prove that most of the rats into which we put pills composed of a mixture of coal tar, scharlach R, and paraffin developed tumors which must, in our opinion, be regarded as malignant. In no case, however, have we observed metastases. We reach similar results when we employ pills of paraffin and coal tar or of lanolin and coal tar. If we leave out the coal tar and introduce pills of paraffin and scharlach R or of paraffin alone, or beeswax alone, or even small aseptic pebbles, we produce tumors with much more difficulty, but have succeeded in a few rats already predisposed to cancer.

We have tried to provoke cancer in rats with pills of paraffin and coal tar, or of lanolin and coal tar, in the region of the peritoneum, the pleura, the liver, and the prostate, without having the least success in any case. We are still busy with experiments in the region of the stomach. We see, therefore, that coal tar is capable of provoking tumors in the region of the bladder in the rat when most of the other organs fail to react to it. It was already known to be impossible to provoke tar cancer of the skin in the rat. On the other hand, it is also known that Moeller has been able to produce cancers of the lung in rats that have been painted on the skin of the back.

There exists, then, a tissue immunity in the presence of the same cancer-producing agent, a fact known since Fibiger made his investigations on the subject of Spiroptera.

Ionium incorporated into lanolin pills is likewise able to produce cancer of the bladder in the rat.

When, therefore, an animal of a given species is receptive for a cancer of a given tissue, it would seem that a simple chronic irritation is capable of starting the neoplastic process.

IV. This is equally true in the mouse. The mouse reacts very readily to coal-tar painting of the skin (100 per cent of cancers). If the skin is burned to the third degree (F. Bang), cancer develops at the level of the cicatrix in a certain number of the burned mice: only those animals that are receptive react. In the same way radium (L. Barlow, F. Daels) provokes skin cancer in the same animal. We were able to produce a cancer in 1 of 30 mice painted for a year with a benzolated solution of carbazol (a product of coal tar). With extracts of tobacco we failed; these were aqueous and were little if at all irritating. We also failed with various other pure substances extracted from the coal tar. In line with the same ideas we experimented with coal tar from Fischer rotating furnaces distilled at a temperature of 400 to 450 degrees C. None of the substances extracted from these tars, including pitch, have ever yet produced cancer. The full tar is very irritating and toxic. In our first series of experiments in painting with full tar we did not produce a single tumor. In a recent series of animals, 2 mice are at the present time developing benign papillomata, 6 months after the beginning of the experiment. It may be that these tumors will become malignant. It is possible, therefore, to obtain by means of these furnaces a coal tar which has little or no(?) cancer-producing property—a matter extremely important from the point of view of prophylaxis. But I believe that when a tar or any other substance is sufficiently irritating, it may, by virtue of this common irritating property, succeed in provoking tumors in animals that are particularly susceptible.

On the other hand, we shall the more readily obtain tumors with an irritant in proportion as the irritation is continued over a longer period. We have demonstrated this fact very simply with the help of a cancer-producing tar; the same total quantity of tar applied for 2 months upon the skin of a series of mice produces infinitely fewer malignant tumors than if it is applied over a period of 4 months (10 to 20 per cent of cancer against 100 per cent).

V. All these principles of oncology deserve to be verified upon a very large experimental basis among various kinds of animals. In experiments with chickens we have tried to reproduce Carrel's experiments in the different stocks of European fowls; that is, we have tried to produce experimental sarcoma (Rous sarcoma) by means of injections of macerated embryonic tissue mixed with arsenious acid or with indol. We have not succeeded in any case in producing anything but benign embryomata. We are at the present time undertaking the same investigations with Plymouth Rock fowls. We think that in fowls, as in other animals, it will be possible, by a careful choice of the tissues to be irritated, to provoke malignant tumors, particularly with coal tar, as Murphy has shown (sarcomata). But will these sarcomatous tumors always be Rous tumors, such as Carrel has produced in his laboratory? If this should prove to be the case, it would be extremely interesting from the point of view of the general etiology of cancer. It is necessary, however, before reaching any conclusion, to avoid all fowls that carry the Rous germs which might become fixed in the soil of a benign embryonic tumor provoked by injection of a macerated embryo, and thus give rise to a malignant tumor. It is in fact known that the Rous virus attaches itself with predilection to traumatized tissues at the point where the injection has been made (by the prick of the needle) or in the region of an inflammatory tumor produced by the soil of diatoms (Murphy, Rous, Pentimalli, and others). We must also avoid accidental contamination (cages, instruments). It would be interesting, I repeat—and that is the most that can be said—to be able to produce Rous tumors by the Carrel method in a laboratory where no Rous tumor has ever been present.

VI. In view of the receptivity and the immunity of certain individuals, genera, and species to a given type of cancer, and in view also of our knowledge in regard to cancer transplantation, it is readily understood how certain investigators try to create this immunity artificially in individuals that are without it. In a recent work Fibiger shows that he immunizes mice against metastases of tar cancers by injecting them with macerations of the skin of embryos. We ourselves tried, with Fibiger in 1922, to produce immunity to tar cancer by means of injections of extracts of spleen and of macerations of various types of tumors. We did not succeed in obtaining any strikingly characteristic result. Since then we have again undertaken in our own laboratories investigations of the same type, trying to produce immunity to tar cancer by means of injections of fresh macerations of tar tumors surgically removed from other animals. We have made these injections throughout the whole period of the paintings and for a month after these were stopped. The results were not striking. The most that can be said is that the injected mice have developed tumors more slowly and have shown a little less in the way of metastases. At all events these investigations do not offer any argument in favor of the infectious theory of cancer.

Other investigations concerning the action of the ions of various metals with or without endocrine extracts of various kinds are not yet sufficiently advanced for us to be able to make a report on them at this time.

DISCUSSION

Dr. Edward B. Krumbhaar, Philadelphia: Dr. Maisin's mention of calling in specialists from the university for consultation on special cases in his Cancer Institute prompts me to emphasize what is perhaps a truism, namely, the value of weekly hospital conferences of all those concerned with the study of cancer patients and their disease.

In the Radiological Department of the Philadelphia Hospital, with a staff made up of 6 or 8 clinical specialists (a pathologist, a radiologist, a physicist and their assistants), such conferences are held every week and we have found them to be of great value.

On such occasions the diagnoses of doubtful new cases are discussed, old cases are brought in to exhibit some unusual development or to consider the desirability of a change in the treatment, and miscellaneous subjects reported, such as new and important work appearing in other places. For instance, the proceedings of this congress will doubtless be reported there. In that way much greater co-operation is secured among different members of the staff than would otherwise be possible. We take no credit for originating this proceeding. The idea was borrowed from the Memorial Hospital in New York, where it is doubtless carried out much more efficiently. But it seems to me to be a very important item in the program of any cancer department of a hospital or cancer institute. It changes the work from that of a number of individuals, striving as individuals, into a co-ordinated effort of a compact group constantly working to mutual advantage.

Dr. Francis Carter Wood, New York City: We all realize the value of such conferences in all branches of medicine. In relation to cancer they would be of even greater value than in other diseases.

CANCER IN DENMARK

By Professor JOHANNES FIBIGER, Copenhagen, Denmark
Professor of Pathological Anatomy, Faculty of Medicine at Copenhagen; President, Committee of the Danish General Medical Association for Cancer Research

DENMARK is one of the countries of Europe in which the morbidity of cancer is very high. In 1922, for example, 4,659 deaths were due to cancer in Denmark proper. In that year the population of this part of the Kingdom is estimated to have been 3,322,700 and the number of deaths 39,461. The number of deaths due to cancer represents 11.8 per cent of the total deaths in that year, and the cancer death rate was as high as 140.2 per 100,000 inhabitants. The total figures for tuberculosis during the same period amounted to only 8 per cent and 94.6 per 100,000, respectively.

The Committee of the Danish General Medical Association for Cancer Research, founded in 1905, organized a general inquiry into the morbidity of cancer in Denmark proper and also in Iceland and the Faroe Islands. It took a census of the cases of cancer receiving medical treatment on one particular day. As regards the census in Greenland, which will be referred to later, the inquiries had to be extended over several years.

In Denmark proper this census was taken on April 1, 1908. More than 99 per cent of Danish doctors replied to the questionnaire sent to them, and the census showed that about 43 per 100,000 inhabitants were suffering from cancer. This was the highest rate ever found in any country.

The information obtained confirmed the extremely high morbidity of cancer in Denmark already shown by the death rate. Nevertheless, before assuming that the incidence of cancer is actually greater than in other countries, we must remember that it is easier to determine the number of cases of cancer in a small country, where there are not only numerous hospitals and dispensaries but also a very large number of doctors, and that there is no difficulty in obtaining accurate information from these sources.

In 1924, 4,690 deaths were due to cancer in Denmark proper. In that year the population of this part of the Kingdom is estimated to have been 3,372,150 and the number of deaths 38,101. The number of deaths due to cancer represents 12.3 per cent of the total deaths in that year, and the cancer death rate was as high as 139.1 per 100,000 inhabitants. The total figures for tuberculosis during the same period amounted to only 8.8 per cent and 99.2 per 100,000, respectively.

The census taken on April 1, 1908, in the Faroe Islands, situated north of Scotland in Lat. 62° N., was not a success, as on that day two doctors were away traveling and so were unable to supply particulars. The number of cancer cases recorded in the census amounted to 4 out of the 18,000 inhabitants of these islands. A fresh census taken with the assistance of all the doctors in the Islands on April 1, 1911, revealed 7 cases of cancer, or 39 per 100,000 inhabitants, as compared with 43 in Denmark.

The Danish Committee for Cancer Research has also undertaken inquiries into the occurrence of cancer in the Arctic countries belonging to Denmark, namely, Greenland and Iceland. The inhabitants of the former, being for the most part pure Eskimos, have hitherto been regarded as very little, if at all, susceptible to cancer. The district of Angmagssalik (native population about 637) had to be omitted from the inquiry, as there are no doctors and it is situated on the east coast, one of the most inaccessible parts of Greenland. The inquiry had therefore to be limited to the inhabited districts on the west coast of Greenland, and even in these regions the great difficulties encountered rendered it impossible to take any accurate census of cancer cases. The west coast district is in parts as much as 200 kilometers broad and extends from Lat. 60° to Lat. 74° N., being about 1,400 kilometers long. In this large tract the inhabitants of which number only about 13,500 persons, living in some 170 villages and colonies, there are not more than 7 doctors to carry out the work of medical inspection. These have to make their journeys of inspection either in motor-boats—often among icebergs and floes—or in sledges which are drawn by dogs, and the mean temperature in this district in winter varies between -17° and -20° Cent. and may fall to -42° Cent. or even lower.

Nevertheless, it has been possible, as a result of the inquiries carried out in the years 1911–1916, to obtain not only reports from all the doctors and from every district on the west coast but also, in several cases, preparations and specimens of tumors, the true cancerous nature of which was revealed by histological examination. In the period 1911–1916, 9 cases of cancer in all were noted among the 13,500 inhabitants of the above-mentioned districts, and in the period 1911–1920 more than 50 cases of benign tumor.

It has therefore been established as a result of these inquiries (the details of which were published either in the Committee's own reports, in the *Bulletin* of the French Association for Cancer Research, or in the *Zeitschrift fuer Krebsforschung*) that neither benign tumors nor cancers are by any means rare in Greenland. Of particular interest are the reports sent in by the Greenland explorers P. Freuchen and Knud Rasmussen on a case of uterine cancer discovered by Dr. Hunt in the Cape York district. This case is proof of the existence of uterine cancer among the Polar race of Eskimos in this region, which is the most northerly part of the inhabited globe. The investigations also show that, allowing for the relatively short length of life among the population of Greenland, cancer is in reality so widespread there that its incidence does not differ very appreciably from that in countries in which cancer is a common disease. Further researches will be carried out in order to corroborate the correctness of this view.

Lastly, on May 1, 1908, the Danish Committee for Cancer Research took a census of the Kingdom of Iceland which is united to Denmark under the same crown. The island of Iceland is situated between Lat. 63.5° N. and 66.5° N., and has an area of more than 102,000 square kilometers.

This census was carried out under the direction of Dr. G. Bjoernsson, head of the Icelandic Health Service, to whom data were sent by all the doctors in the island. The number of cases of cancer recorded amounted to 23 out of a total of 83,000 inhabitants, *i.e.*, 28 per 100,000 as compared with 43 in Denmark. As Dr. Bjoernsson points out, this difference is perhaps only an apparent one, because the inhabitants of isolated districts of Iceland, where the population is scattered, rarely call in a doctor. In any case, the information which we have obtained from the census shows that, contrary to the view once held, the morbidity of cancer in Iceland is very considerable.

In Denmark proper, the relative incidence of cancer in the different parts of the body is on the whole similar to that generally found in most other European countries. The most frequent forms are cancer of the stomach, cancer of the mammary glands, and uterine, cutaneous and intestinal cancer, and of these the most frequent of all is cancer of the digestive tract.

The so-called "occupational" forms of cancer, several of which are common in various industrial countries in Europe, are non-existent in Denmark, which is an agricultural country.

Cancer of the stomach is also common in the Faroe Islands and Iceland, but, according to the figures for Greenland, not a single case has been found in that country, and in the reports for the years 1911–1920, Greenland doctors mention only very few cases in which there were grounds for diagnosing cancer in the digestive tract.

In spite of this, the rare occurrence of these forms of cancer observed in Greenland up to the present may only be apparent and may be due to the same causes as those believed to be responsible for similar phenomena in tropical countries, viz., the comparatively short lifetime of the inhabitants, whereby the number of cases of intestinal cancer is reduced, and the enormous difficulties which not only prevent the carrying out of a general medical inspection in these countries, but also render it peculiarly hard to obtain reliable diagnoses of cancer of the digestive tract. These difficulties are enhanced by the more or less marked repugnance of primitive peoples to calling in medical aid for internal complaints.

MEASURES TAKEN FOR THE TREATMENT OF CANCER

The question of the necessity of establishing in Denmark special institutions organized solely for the treatment of cancer patients (hospitals, nursing homes, special wards, etc.) has been discussed on several occasions. The Danish Committee for Cancer Research instituted an inquiry into this subject among Danish doctors particularly interested in the proposal. Neither the results of this inquiry, however, nor the discussions held in connection with it proved favorable to the establishment of such institutions. One of the reasons for this is that in Denmark every effort is made to conceal the diagnosis from patients suffering from cancer, as the generally accepted medical opinion is that the disastrous effect produced on the patient if he learns the true nature of his disease must as far as possible be avoided.

A further argument against the necessity of founding special institutions for the treatment of cancer is that most Danish hospitals do not object to the admission of cancer patients, and also that medical assistance can be obtained without difficulty and is generally resorted to throughout Denmark proper; moreover, among the less well-to-do and the poorer classes of the population the great majority of persons are members of provident societies to which specialists are attached. The law on the free treatment of poor persons suffering from chronic diseases also provides facilities enabling cancer patients to obtain the necessary treatment.

The X-ray treatment of cancer has, of course, led to the founding of institutions which take a large number of cancer patients. The Finsen Medical Institute, for example, has for many years been applying phototherapeutic treatment to cutaneous cancer, and this treatment is now almost invariably combined with roentgen-ray treatment. The X-ray treatment of cancer is applied both in the hospitals at Copenhagen and other towns and also in provincial hospitals and private clinics. This method is also employed at the Finsen Institute and, as will be seen later, at the radiotherapeutic center.

The curie-therapeutic treatment is organized in Denmark by the Danish Radio-Therapeutic Foundation, which was established in memory of King Frederic VIII and is under the patronage of His Majesty King Christian X. This Foundation, which was constituted in 1912 under the presidency of M. Jacob Appel, formerly Minister of Education, is under the joint direction of doctors and other persons representing widely differing social classes. The original object of the Foundation was to obtain funds for the purchase of a sufficient quantity of radium element to introduce the Curie treatment in Denmark. The necessary funds were obtained partly through a public subscription organized throughout Denmark and partly by means of a governmental grant, and the Foundation was able in 1913 to open at Copenhagen its first center for the Curie treatment.

Similar centers were established shortly afterwards in the towns of Aarhus and Odense. These centers were intended primarily for the treatment of cancer, but in view of the objections to the establishment in Denmark of special institutions for the treatment of cancer, non-cancerous affections for which treatment by radio-active substances is beneficial were also admitted to the centers; further, the necessary equipment was installed for applying roentgen treatment either alone or in combination with other methods. The Copenhagen hospitals were allowed to lend their radium preparations, which enabled hospital doctors to observe for themselves the effects of the Curie treatment, which at that time was new. The quantity of radium available for these centers, however, soon proved insufficient, and the general working conditions were not satisfactory. We need only mention that the center did not possess sufficient beds to accommodate even a few of its patients.

In 1920, the situation had reached a stage when it was considered absolutely necessary to appeal once more to the public and to the Government for sufficient funds to purchase the necessary quantity of radium element and establish and run a clinic on absolutely modern lines. A national subscription was opened in 1921 and, with the aid of a Government grant of 500,000 Danish crowns, a sum amounting in all to more than 2,000,000 crowns was obtained. With these funds, about two grams of radium element were purchased, and a radium-therapeutic center was established in a villa previously occupied by the Finsen Medical Institute, to take the place of the former radium institute at Copenhagen. An agreement was at the same time made with the Finsen Institute under which the doctors of the latter institute engaged in phototherapeutics assist, each in his own special branch, those employed in the new institute of curie-therapeutics. The mutual benefits of co-operation were thereby secured by the two institutions, both of which employ the method of treatment by radiation.

The new Institute of Curie-therapeutics was inaugurated in 1922. It possesses accommodation for the treatment of both out- and in-patients, the latter in wards with accommodation for 24 patients. Besides the wards and the operating theater, there is an X-ray theater with an apparatus for deep radiotherapy, which, at this institute, is frequently combined with curie-therapeutical treatment. The latter is largely applied by means of radium salts; as regards the supply of radio-active substances to hospitals, which is the other main object of the institute, the latter possesses no less than one gram of radium in solution, the emanation of which is supplied to hospitals upon application. The production of emanation, the testing of the strength of preparations, and similar work is carried out in laboratories under the charge of physicists. A surgeon and a radiologist are attached to the institution for superintending medical work; as a result of experiments made some time ago in the treatment of internal diseases, the institute now employs, in addition, a specialist in that branch of medicine. In addition to the medical staff, the institute employs an anatomico-pathological assistant, and, by its agreement with the Finsen Institute, obtains the assistance, when necessary, of the specialists in dermatology, ophthalmology and otolaryngology who are attached to that institute.

In order that the Institute of Curie-therapeutics should not, for the patients' sake, be considered by the public as a cancer clinic where cancer cases alone are treated, the institute also admits patients suffering from benign affections.

The diagnosis and histological examination of neoplastic tissues removed by biopsy, curettage, or major surgical operations is undertaken both in the Danish general hospitals and in many clinics by prosectors and competent assistants, who are specially engaged and remunerated for this work. The histological analysis of tissues removed from paying patients attended by doctors in private practice is undertaken upon application by the doctor attending the case and at the expense of the patient.

Since 1909 the Committee of the Danish General Medical Association for the Study of Cancer Research has undertaken to carry out free of charge a histological examination of tumors and tissues in which cancer is suspected and which have been taken from poor patients who have not been examined in clinics or hospitals and cannot afford to pay for examination. The examining doctors authorized and engaged by the Committee are the most competent anatomico-pathologists in Denmark. There are at present 6 of these examiners in all and they are paid 9 crowns by the Committee for each histological examination. The professor of pathological anatomy, who acts as director and sometimes as advisory examiner, receives no remuneration. The Danish Government has invariably defrayed the necessary expenses and still does so. The sum appropriated for this purpose by the Government in 1924 was 9,000 Danish crowns. Since July, 1925, arrangements have been made with 42 hospitals and infirmaries throughout the country to pay to the Committee 5 Danish crowns for each histological examination carried out by the examiners of the Committee.

The following is the procedure to be followed with regard to examinations:

A doctor desiring an examination gratis must apply in writing to the Institute of Pathological Anatomy of Copenhagen University.

He receives by return of post: (1) order cards (*cf.* order form below) on which he enters particulars of the patient; (2) instructions for the preservation and despatch of specimen tissues removed for histological examination (*cf.* instructions below); (3) a list of pathologists authorized by the Committee to undertake examinations, with their private addresses and the addresses of their laboratories.

Having filled in the order card, the doctor sends it, together with the specimen tissues to be examined, direct to the examiner he has selected. The examiner, after completing the examination: (1) sends the doctor as soon as possible a notice of the results of the examination; (2) at the same time he enters the result (together with all details) on the order card and forwards the latter, accompanied by microscopic preparations (where necessary, the remainder of the anatomical specimen, the paraffin cubes, etc.) to the Institute of Pathological Anatomy.

The preparations, accompanied by the corresponding order cards, are deposited with the Bureau of the Committee (at the Institute of Pathological Anatomy), which places them in its collection and retains possession of them.

The Commitee reserves the right of utilizing the preparations, but the doctor who forwarded the specimens may also make use of them upon application.

The object of the free histological examination is accordingly twofold: (1) The histological diagnosis of tumors in all cases in which patients cannot afford it. (2) The formation of a collection of preparations, with relevant particulars, to be used for scientific research.

INSTRUCTIONS BY THE BUREAU OF THE COMMITTEE

Method of Effecting the Excision, Curettage and Despatch of Suspect Tissues

1. When excising a suspect ulcer, please send, where possible, the adjacent healthy tissue.
2. After excision, a non-ulcerated suspect tumor should be sent, if possible, in its entirety.
3. In cases of cancer of the body of the uterus, please send tissue taken from the body walls, and a complete section, from top to bottom, of the tissue lining the cavity.
4. When removed, tissues must be placed in fixing liquid as soon as possible and preferably immediately after removal. An alcoholic solution of formaldehyde (1 part commercial formaline to 3 parts alcohol at 70) is recommended as a fixing liquid. If no formaline is available, use pure alcohol. No other substance should be employed, even temporarily.
5. Bottles must be carefully stoppered and the top covered with water-tight material well fastened down. To avoid mistakes, each bottle must bear the name[1] or initials of the patient and date of despatch.
6. The specimen must be sent direct to one of the Committee's examiners.
7. The specimen must be accompanied by an order card properly filled in.
8. The examiner will in no case undertake a microscopic examination until he has received the order card.
9. The doctor will be informed by the examiner of the result of the microscopic examination.

SPECIMEN ORDER CARD

To the Committee of the Danish General Medical Association for Cancer Research

............., medical practitioner, (address).......... hereby applies for a microscopic examination for cancer, sarcoma, or malignant tumor in the accompanying tissue, removed by ...., date .... preserved .... Person from whom removed.....................

1. Non-paying patient (name or initials)..
2. Sex..
3. Age..
4. Married or single..
5. Address..
6. Profession..
7. Presumed seat and nature of tumor...............................

---

[1] The name of the patient, if given, is to be regarded as confidential.

8. If microscopically examined previously, state results.

9. Have the patient's husband (wife), children, brothers or sisters suffered from cancer or malignant tumors? If so, in which organ?

10. Have any persons living in the same house or in the neighborhood suffered from cancer or malignant tumors? If so, state nature of tumor, date and organ.

11. Are there any grounds for assuming infection?

12. In case of a female patient, has the patient been a mother or has she had a miscarriage?

13. Does the history of the case show any other facts which merit attention, *e.g.*, alcoholism, syphilis, excessive smoking, chronic irritation, malnutrition, etc.?

14. At what period did the tumor begin to develop?

15. Is the patient suffering or has he previously suffered from any other chronic diseases? If so, state disease.

Eight thousand three hundred and twenty-four specimens forwarded from all provinces in the Kingdom of Denmark proper were examined between October 8, 1909, and January 1, 1924. Specimens have also been sent by doctors from Greenland, the Faroe Islands, the former Danish colonies in the West Indies, and Iceland.

The largest number of specimens were obtained by curettage of the uterus; next came excisions from the mammary gland and the skin; the remainder included specimens taken from practically all the other organs. The examinations carried out gave the following results:

Carcinoma	2,077
Carcinoma (doubtful)	87
Sarcoma	537
Sarcoma (doubtful)	42
Malignant tumors of other kinds	78
Benign tumors (and doubtful malignant tumors)	1,648
Inflammation, necrosis, hæmorrhage, tuberculosis, actinomycosis, syphilis, lymphogranulomatosis, hyperplastic alterations of the endometrium, etc.	2,916
Alterations of the endometrium due to pregnancy	335
Normal tissues	572
Doubtful	32
	8,324

Out of the 8,324 specimens examined, 4,469 were diagnosed as due to tumors, of which not less than approximately 2,700 were malignant.

The foregoing regulations, which have been in force for about fifteen years, may be considered as entirely satisfactory; neither doctors nor examiners have made any adverse criticism of them.

STATEMENTS, APRIL 1, 1926

Eleven thousand one hundred and thirty-nine specimens forwarded from all provinces in the Kingdom of Denmark proper were examined between October 8, 1909, and April 1, 1926. The examinations carried out gave the following result:

Carcinoma	2,735
Carcinoma (doubtful)	110
Sarcoma	669
Sarcoma (doubtful)	50
Malignant tumors of other kinds	136
Benign tumors (and doubtful malignant tumors)	2,076
Inflammation, necrosis, hæmorrhage, tuberculosis, actinomycosis, syphilis, lymphogranulomatosis, hyperplastic alterations of the endometrium, etc.	4,096
Alterations of the endometrium due to pregnancy	456
Normal tissues	741
Doubtful	70
	11,139

Out of 11,139 specimens examined, 5,776 were diagnosed as due to tumors, of which at least 3,700 were malignant.

The foregoing regulations, which have been in force for about seventeen years, may be considered as entirely satisfactory; neither doctors nor examiners have made any adverse criticism of them.

DISCUSSION

DR. FRANCIS CARTER WOOD, New York City: The Danes have always faced the exigencies of life frankly and fearlessly. It is therefore strange to hear that they cannot face the diagnosis of cancer. Perhaps if they were able to do so, their mortality would not be as high as it is.

DR. WILLY MEYER, New York City: It has been most interesting to listen to the various papers that have been read so far by our foreign guests, representing as they do most of the nations of Europe. The two remaining papers, that from Italy and that from Germany, which we shall hear tomorrow, will probably tell us of similar arrangements. We learn from these papers that there is no fundamental difference in the countries of Europe between the arrangements there and those we have made in our country in the fight against cancer.

We have in this country, as is well known, two societies for this purpose: the American Association for Cancer Research and the American Society for the Control of Cancer. It is well that we have this arrangement, because, after all, the Association for Cancer Research has been inaugurated by those who are trying to find the origin and nature of the disease, and the Society for the Control of Cancer has been founded to educate the medical profession and the public regarding cancer.

A short time ago I received a clipping in which was printed a letter from a renowned surgeon of England who had just resigned from the British Medical Association. In his letter of resignation he complained that while his confrères in America could go into the press and write freely about their experiences in treating disease in order to enlighten the public, this could not be done in England. He thought it should be done in England, too. On reading that notice I said to myself: "Our colleague has not been correctly informed regarding the custom here in our country," for, as far as I know, none of us has the right, and no physician does attempt, to educate the public through the medium of the newspapers. It is against our principles of medical ethics, and rightly so.

But we have our National Tuberculosis Association, our Society for the Control of Cancer, and the Gorgas Memorial, which organizations have taken it upon themselves to educate the public, clearly and scientifically, by means of the press, and do not allow this knowledge to be distributed by non-medical reporters who cannot possibly be sufficiently trained in the scientific questions of the day. We doctors who take an interest in letting the public know the true state of affairs can, therefore, never be too grateful to the American Society for the Control of Cancer that it has taken this step of instructing the public correctly about cancer through its managing director. This is the only way for the truth to come out. It means education of the medical profession as well as of the public, and the public cannot possibly know what is correct and what is incorrect as regards cancer unless it receives its information directly from reputable authority.

THE MOVEMENT IN ITALY FOR THE CONTROL OF CANCER

By Professor RAFFAELE BASTIANELLI, Rome, Italy
Vice-President, Italian League for the Control of Cancer; Associate Professor of Surgery, University of Rome

WHATEVER may be the influence exerted upon the control of cancer by a well-conducted campaign of education and the measures connected with it, especially early diagnosis and early treatment, we cannot hope to engage in the fight with wholly effective weapons until the cause of cancer is known to us. We must unfortunately recognize that our present treatment of this disease has perhaps advanced nearly as far as possible and that even if a larger number of cases are submitted to early treatment, there will always be some that will not derive much benefit from it. So that our chief aim in trying to control cancer must be in the study of its cause, and our campaign must be divided equally between research and control.

The Italian League is very young and cannot boast of any special results, but if we look around at the older leagues and especially at the more than century-old Middlesex Hospital of England, we must conclude that money, organization, persistent labor, and researches wonderfully conducted, though they have contributed extensively to the knowledge and treatment of cancer, have not yet brought us very far toward the discovery of its cause. Before describing the material part of our organization, I wish to recall the efforts made in Italy to study the scientific side of the question, studies chiefly due to private work conducted with private means.

STATISTICS

It appears essential for us to know in exact figures the spread of cancer in the different countries and the different sections of these, in order to know whether or not there is a gradual increase and to discover what factors in the human organism and what contribution from its environment probably influence the incidence of the disease. It is doubtful whether we have gained any knowledge from these painstaking statistical studies that has any influence on the prophylactic measures against cancer, and even whether we have come to any correct conclusion on the apparently simple question as to whether cancer has a tendency to increase.

The Italian statistics as compiled and studied by Gherardi for the period 1915–1917 showed a rather alarming increase from 422 cancer deaths per 1,000,000 population in 1889 to 675 per 1,000,000 in 1917. I believe it is necessary to give some interpretation to such figures, for it does not seem to me right to compare such a recent year as 1917 with the remote one of 1889. If we follow the curve of mortality (drawn by Lutrario) from malignant tumors over a long period, that is, from 1889 to 1921, we see a rather sharp and continuous increase from 1893 to 1911, but from that year until 1921, that is, for ten years, there is almost no increase or only a trifling one. The difference between 1889 and 1917 is, therefore, certainly due to many reasons, of which a very important one is that the average duration of life has considerably increased; for example, in the 50-year period from 1861 to 1911 the number of persons living beyond the age of 65 increased in the proportion of 100 to 214.

Besides the improved means of diagnosis, the facilities for transportation and hospital treatment, which were not very much developed in Italy in 1889, have changed entirely.

These facts and other important modifications in the composition of our population make a definite answer quite uncertain.

We see a striking difference in the ratio of deaths from cancer in the different provinces of the Kingdom, as, for instance, in the 5-year period 1887–1891 there was a mortality of 61 to 70 per 100,000 inhabitants in Tuscany, but only of 17 per 100,000 in Sardinia. The first is the most progressive province, the last still far from having reached such a height, hence there are difficulties of diagnosis, inquiry, etc.

Recently the Italian Bureau of Public Health has ordered a medical inquiry on malignant tumors in the whole Kingdom in accordance with the program of the International Committee for Hygiene of the League of Nations and that of the Italian Section of the Cancer Committee. For this purpose 6 different blanks have been prepared. The first, drawn up by the National Bureau of Statistics, takes account of the influence of professional factors on the incidence of cancer. The next 3 were distributed among the hospitals and clinics with a view to tracing each case of malignant growth backward through the period 1911–1921, and following it up through the period 1924–1929. Two of these 3 are especially concerned with malignant tumors of the breast and uterus, respectively, and the third with malignant tumors of all other possible locations. A fifth blank, designed only to ascertain the cases of death from malignant tumors, is to be filled in by health officers or doctors who have charge of giving death certificates. The sixth blank has been distributed among the pathologic departments of hospitals for the purpose of recording the detailed macroscopic and microscopic findings in every case of malignant tumor coming to autopsy.

The results of this broad inquiry are not yet available. The latest statistics published regarding deaths from malignant tumors in Italy are those for the year 1924, which show about 28,000 as against 23,984 in 1917. Such a conspicuous apparent increase cannot be accepted as representing an absolute increase of the disease, as there has been a large increase in the population, and certainly in the average duration of life, so that a conclusion seems premature unless all possible factors are carefully considered. I will not go into the details of these last statistics, as it would bring me into another field of inquiry, but one thing I must point out, namely, that a large percentage of cancers are not diagnosed or are diagnosed too late for treatment. I believe this must be true of all nations—and it would be interesting to know the individual proportions for each nation.

THE SCIENTIFIC STUDY OF THE CANCER PROBLEM

Scientific research in the subject of cancer has found in Italy a number of independent workers, but up to the present time, unhappily, no co-ordinated effort has been made to bring all or any part of these together so as to make a systematic plan of research possible. Foa, Sanfelice, Roncali and others have especially dedicated their work to the finding of a pathogenic agent of this disease, but their conclusions, such, for instance, as the finding of blastomyces neoformans by Sanfelice, could not be confirmed by others.

The non-parasitic theory has been supported chiefly by Durante, who, even before Cohnheim's publication, expressed the opinion, derived from the study of the malignant degeneration of moles, that new-growths are of embryonic origin. More recently Fichera, as the result of much research work both on his own part and on the part of those inspired by him, has come to the conclusion that malignant tumors are not parasitic but are due to a disturbance in the balance of the factors which rule the growth of tissues and organs. He has called this disturbance "loss of oncogenic balance," meaning thereby that the factors which normally inhibit or diminish the growth of tissues are less active or not active at all, while the opposite factors are increased. Such factors are connected with the function of certain organs, such as, for instance, the spleen and thymus, which act as inhibitors of growth, or the sexual glands, which favor growth, and they are related to the activity in general of the hæmatopoietic system. In the older age period the inhibiting factors slowly disappear, so that any abnormal or too active cellular growth taking place in a tissue as the result of some accidental local irritation or other condition, can no longer be checked by the powers of the organism. It has been demonstrated by Fichera and his pupils that such oncogenic factors prevail in experimental tar cancer also, since the tumors are generally obtained only after a long time, and then not in every individual, so that the anatomic and functional conditions of old age are already established, and the organism has been put in a state of toxicosis by the agent that has been working not only locally but also generally for so long a time. So that in cancers experimentally produced, as well as in those cancers occasionally appearing in consequence of parasites (spiroptera neoplastica, cysticercus fasciolaris, bilharzia) or of other agents (for instance, X-rays), the individual disposition has its origin in some toxic general effect which the agent induces in the organism.

It has been successfully demonstrated by Fichera that autolyzed extracts of some organs have a lytic power on experimental tumors, even to the point of checking or completely curing a growing transplantation; hence a great hope arose of obtaining the same in human cancer. But so far these researches on human beings have not proved effective.

Conclusion. The part played by the constitution, either congenital or acquired, is of fundamental importance in the origin of tumors, and a rational therapy of the future will be a biologic one; that is, it will seek, on the one hand, the restoration of the normal laws regulating the growth of the tissues, and, on the other, the suppression of all factors favoring the newgrowth. I could mention many other researches and many names, but I must necessarily pass over these. However, I cannot refrain from referring to the researches of Pentimalli on chicken tumors, which have demonstrated that the action of the virus is exerted directly on the connective tissue and muscle cells, but that this occurs only when these are in a state of undifferentiation, which is induced by the irritation or stimulus of the injected material. Pentimalli has also studied the conditions which favor metastasis and has controlled Gye's experiment, with negative conclusions.

Rondoni's work on experimental mouse tumors, and especially on the influence of carbohydrates and lipoids on the growth of these, is presenting certain working hypotheses which must be developed further.

It is worth while for people interested in X-ray treatment of tumors to read the publication of the late Professor Ghilarducci and of his pupils, as full of original thoughts and practical applications.

With an allusion to the existence and the prosperous increase of a journal entitled *Tumori*, edited by Fichera since 1911, I will end this short survey of Italian scientific activity. This will certainly be stimulated by the Institute for the Study and Treatment of Malignant Tumors which is being built in Milan by national subscription under the supervision of a national committee, to whom the Italian Red Cross and the Italian League for the Control of Cancer have given the most effective support. The cornerstone has already been laid by his Majesty the King, who contributed a large sum toward the endowment of the institute foundation.

Social activities and the promotion of science are alike the aim of the Italian League for the Control of Cancer, and I do not need to insist especially on these, as they are the same ends which every league in the world is pursuing.

THE WORK OF THE ITALIAN LEAGUE

The Italian League was constituted in 1922 under the presidency of the late Professor Foa; he was succeeded by Professor Marchiafava, and the latter, in 1924, by Professor Lustig, who is now President. It is only very recently that the League has been in a position to do effective work, since various circumstances have prevented this. Its action has of late been vigorously supported by the Italian Government with special laws and arrangements to be mentioned later.

The organization of the League consists of a Central Council in Rome, having directive powers, and of committees or sections in each province of the Kingdom and in the Italian colonies. The Central Council co-ordinates and supervises these outside institutions in their activity, which is left free to develop in the way most suitable to the place where the work is done. Through the Central Council's influence and by its financial support a number of centers for the pathologic diagnosis of tumors have been established, to which any doctor can send specimens to be examined. For this purpose definite rules have been formulated, which have not only been sent out in the form of circular letters to a very large number of doctors, but have also been spread throughout the country through medical journals and through the *Bulletin* of the Medical Federation.

Our League is in addition developing a continuous propaganda not only among the laity but also among physicians, in the conviction that they are the ones chiefly responsible if cancer cases are not diagnosed and sent promptly to competent men and institutions for treatment. For this purpose the League has promoted lectures in many centers and published leaflets relating to this question, which it has freely and widely distributed. This propaganda has the support of the minister of Internal Affairs, who through the general director of Health of the Kingdom has sent circular letters to the prefects of the provinces to stimulate and co-ordinate public and private initiative, thus supervising the existing institutions and encouraging the establishment of future ones. A large sum has recently been appropriated by the same ministry to help the existing centers of diagnosis and to institute new ones in the Kingdom.

Special hospitals for cancer have not yet been planned, except for the new institute in Milan. But sections or wards of general hospitals dedicated to the relief of inoperable tumors will soon be instituted in Rome through the influence of our League. Roentgen therapy and curie-therapy are given freely in the Institute of Radiology of the Medical College in Rome and the Government has already secured a large quantity of radium for scientific and therapeutic purposes to be distributed among the universities of the Kingdom. A private society is also helping to treat poor patients by lending radium to competent men on the staff of our hospitals.

CONCLUSION

To sum up, the efforts made in Italy for the control of cancer are very young, and practical results cannot be expected as yet. Judging from the activity which has been stimulated, especially through the devoted work of Professor Lustig, the president of our League, and from the interest which the Government has shown, we may hope that cancer control will not remain a vague phrase, and also that the scientific work will be diligently prosecuted by the new institute and by men like those mentioned above, who have made valuable contributions to science.

THE ORGANIZED MOVEMENT FOR CANCER CONTROL IN GERMANY

By Professor FERDINAND BLUMENTHAL, Berlin, Germany
Director, Institute of Cancer Research, Berlin; Professor of Internal Medicine, University of Berlin

THE campaign against cancer is carried on in Germany as in other countries in two different ways: by means of scientific research and by explaining matters to the people at large. This explanation consists in the requirement of certain prophylactic measures and instruction regarding the early symptoms.

Prophylaxis is based on the knowledge of certain preliminary complaints, which are the consequence of chronic chemical intoxication or chronic infection and the fact that wounds (bruises) or hurts of nævi, warts, burns, scars and so on may later on cause a malignant growth.

The recognition of the early symptoms is therefore important, because cancer, if curable at all, seems curable only in its initial state. For this reason there is a continual conflict with the quack doctors because they not only yield no benefit by their inadequate treatment, but also allow the time to pass by when an operation and use of X-rays may yet prove effectual.

In Germany cancer education is given by means of popular lectures and pamphlets.

FORM OF ORGANIZATION

The organization of this campaign is carried on by the German Central Committee for the Study and Control of Cancer, upon whose board of directors are representatives of the Government, besides the foremost physicians and great cancer research workers. This committee meets four or five times a year, when everything regarding the cancer campaign is reported and any important new results of research are communicated. The chairman has always been a prominent member of the Berlin faculty of medicine; the vice-chairman, the president of the Ministry of Public Welfare. The secretary-general, who does the real work and has charge of the office, was at the outset the meritorious organizer and fellow-founder of the Committee, the late Professor George Meyer; the office is now held by the director of the Berlin Cancer Institute.

The other members of the board of directors, called the Commission, are representatives of the city of Berlin, of the Reichs-Board of Health, of the Reichs-Insurance-Office, the directors of the Charité, and the presidents of the committees of Bavaria, Saxony, Baden, Hesse, Oldenburg, Thuringia, Hamburg, and Lubeck, in which States, in connection with the Central Committee, the particular work is done.

The committees are financed by their States. The German Central Committee receives at present from Prussia 6,000 marks, as compared with 10,000 marks before the war. In addition, certain insurance companies and mining associations pay yearly from 20 to 200 marks. The Committee has less than 7,000 marks per year at its disposal.

This year we have organized a department for cancer at the Health and Social Welfare Exhibition at Duesseldorf (Gesolei), showing live rats and plants with cancer tumors. Pictures are also exhibited demonstrating the origin, the progress, and the treatment of cancer. Posters are displayed where they are visible to every one, on which short sentences are written, such as: "Cancer can be cured by means of operation and by X-rays, provided it be diagnosed early enough." The German Central Committee also issues a magazine on cancer research. Research workers receive financial aid from the Committee. Single sums from 200 to 500 marks are granted yearly. The Committee meetings are held in Berlin.

A special point is made of helping physicians to reach an early diagnosis. A competitive essay by Dr. Fischer-Defoy has been printed and circulated, also a pamphlet by Professor Winter of Koenigsberg, entitled "The Cancer Campaign in East Prussia."

The Kaiserin Friedrichhaus for Medical Instruction has, together with myself, worked out a lecture regarding the nature of cancer and how to fight it, accompanied by illustrations and lantern slides for physicians, so that they may use it as a groundwork for their own lectures. In all large towns there are examining stations, where examinations of specimens of tumors are made free of charge.

Courses are given for the instruction of nurses and midwives so that, when they come in touch with the public, they are in a position to tell people about the early symptoms of cancer and the importance of seeking medical advice at once. This way of fighting cancer is undertaken in the single States of Germany by the local committees, and these are always in touch with the German Central Committee, which, through lecturers, the sending of material and remittance of money, supports the endeavors of the single States, and at the same time represents the Local Committee for Prussia.

What is wanting is money. Besides the above-mentioned 7,000 marks, no contributions are made, nor are there any bequests from private individuals for the general cancer campaign.

THE FORMATION OF CENTERS

Since cancer institutes and cancer departments began to be founded in Germany, in the beginning of this century, they have become more or less the centers of the cancer campaign in those parts of the country in which they have been established. First a clinic and a scientific institute, under the name of Samariterhaus, were founded by von Czerny at Heidelberg, which became the center of a scientific cancer campaign for the whole of South Germany.

In 1903 a cancer department for 20 cancer patients was established in the Charité in Berlin in connection with Leyden's clinic, essentially to give Leyden an opportunity of continuing his work regarding the parasitic origin of cancer. When Leyden died in 1910, Emil Fischer, the celebrated chemist, and George Klemperer were entrusted with this department in order to test the value of certain selenium compounds upon human beings, these preparations supposedly having been proved effective in animal experiments. But the tests led to no useful results, and when the war broke out, the institute was closed.

Toward the end of the war a plan made by me for the reorganization of the Berlin Institute and the erection of a clinical hospital and a radiation department was accepted and carried through under the direction of Orth and myself.

Later on, a department was opened in the Institute for experimental cellular research under the management of Rhoda Erdmann, and today the Institute possesses, besides the original sick wards for 20 patients in the Charité, an out-patient clinic visited annually by more than 2,000 patients, a radiation department in which 50 cancer patients are treated daily with X-rays, radium, and thorium X, and a hæmatological department.

At Frankfort there was a department for experimental cancer research in the beginning of this century, attached to the Ehrlich Institute, which, however, occupied itself merely with scientific work and not with the treatment of cancer patients. Later on a similar department under the management of Dr. Bierich was founded in Hamburg.

These cancer institutes and departments are partly supported by the State and partly, like the Heidelberg and Berlin Institutes, by means of money collected privately.

The working classes in Germany being fully organized in sick-funds, the cancer patients are treated at the expense of these funds, and we draw from them, without difficulty, about two-thirds of our total proceeds. The remaining third part is paid by those who have no organized sick fund, who are chiefly made up of the impoverished middle classes.

The middle class, to which belong today all public officials, all former property-owners, all senior lawyers and the greater part of the mercantile class, is not in a position in Germany to pay anything at all for treatment. For some of these, charitable organizations pay; others have to be treated gratis, so that—strange to say—the so-called better classes with their fastidious demands, which they keep up during their treatment in the Cancer Institute, constitute a great financial burden to the Institute, whereas the help of the sick funds for the working classes represents, as it were, the financial back-bone of the Institute.

Cancer institutes or special departments for the treatment of cancer patients are, generally speaking, not popular in Germany. It is maintained that they would seem to the public like death houses and be looked upon with horror. Hence, for the most part, in place of special departments an assistant is charged with the scientific work of the cancer problem, or with the radiation treatment of cancer patients, usually in the surgical hospital.

The difficulties which Czerny had to overcome at the establishment of the Heidelberg Cancer Institute were depicted by him in its day.

The Berlin Institute could carry its point only by succeeding in enlisting the interest of the Government for the Institute, and then only when the money had been raised for it by private subscriptions. While I found but little support among physicians and students of medical science, I succeeded in interesting lay circles, especially the deputies of the Prussian National Assembly. Had it not been for these the Institute would have been closed, for influential medical judges had declared that the existence of cancer institutes was superfluous, on the ground that cancer research and cancer treatment could just as well be carried on in other scientific institutes and hospitals.

An institution such as you in America call a "temporary" clinic would be objected to by private physicians here, who would assert that their reputation would be discredited if physicians from great hospitals in other cities were consulted, or if some of these were put forward as particularly qualified with regard to cancer work, owing to their occupation in such hospitals.

Above all, the objection has to be overcome, that in all large cities the hospitals, containing surgical departments and affording an opportunity for X-ray treatment, have all the requirements for cancer diagnosis and treatment already at hand.

DIFFICULTIES ENCOUNTERED

It is difficult for the advocates of special cancer departments to carry on their campaign with a statement of the whole truth, namely, that for the X-ray diagnosis of malignant growths and for the application of an effectual therapy an amount of experience is necessary which cannot be acquired with the little material available in middle-sized towns of from twenty to a hundred thousand inhabitants, especially when the material is dispersed.

It is our observation in the Cancer Institute, that, as a rule, early diagnosis is definitely delayed and that radiation treatment is carried out by many who understand but little of it, not to mention the fact that the necessary radium treatment, or the treatment with thorium X by the larding method (Spickmethode), is scarcely ever applied outside of the larger institutes,—the former, owing to the lack of radium, and the latter, on account of the technique not being understood.

I do not think that I exaggerate, when I assert that, while the surgical treatment of cancer is carried out nearly everywhere in Germany to practical perfection, the places are relatively few of which one can say that radiation is adequately done. Hence it is that radiation has often been discredited in consequence of wholly unsatisfactory results, and that there is an inclination to turn away from radiation altogether, and to put confidence in some new remedy, for which much advertisement is made.

You see, we have very dissimilar circumstances in Germany. In certain large places, like Berlin, Erlangen, Heidelberg, Frankfort, Hamburg, Munich and Freiburg, where cancer institutes exist, we may say candidly that the arrangements for diagnosis and treatment of cancer patients answer the requirements. I am sure this is also the case in one or another town besides, but a great deal can and must yet be done in Germany before one can say that the diagnosis and the treatment of cancer are practically up to date, to correspond with the standing of scientific knowledge.

Dr. Roesle has recently prepared mortality and morbidity statistics for the whole of Germany, based upon the total number of cancer cases coming to autopsy. These statistics are the more important as showing that cancer is on the increase in Germany. Deaths from cancer have in some parts of the country outnumbered those from tuberculosis, and far exceed the latter in persons over 50 years of age.

The German Central Committee is the deliberative body for all cancer questions for the entire east of Europe. From Roumania, Jugoslavia, Hungary, Poland and the Baltic States questions are directed to us. An important mission of the Central Committee is also to support scientific research.

CANCER CONTROL IN EASTERN EUROPE

The experience, however, which we have had in Germany with letters received from other countries proves that, with the exception of Russia, nothing is being done in the rest of Eastern Europe. When patients from these States wish to come to Germany for treatment, the Governments make all possible difficulties.

I have very rarely received any answer to the plans I have drawn up for the organization of cancer control or to inquiries as to whether what I had proposed had been carried out in those countries. I drew up these plans partly at the request of individual men prominent in the medical profession, and partly at the request of official authorities of the countries in question. Often I was informed that there was no money on hand. I am of the opinion that those who wish to organize a cancer campaign in such countries should receive an international appeal urging them to this course. We must adopt such a resolution and make it known to the whole world. We must also support these countries, more than hitherto, by providing speakers and by sending them money, appliances for teaching, and pamphlets.

Nor is it only money that is wanted; there is a certain inertia prevailing, due partly to the thought of the hopelessness of cancer control—an opinion which is of course founded on an ignorance of the facts. A single place must be established where the printed material concerning cancer control in all countries is collected, so as to ascertain what is really being done.

Existing popular papers, as, for instance, our *Merkblatt*, should be translated into as many foreign languages as possible, and suitable persons found to distribute them.

Experts on cancer questions should be summoned to travel in the respective countries, create organizations there, and by means of lectures instruct a circle of physicians, who again, in their turn, will instruct other physicians. An International Central Committee ought to be established, having sub-committees in all countries, carrying out our ideas and for this purpose controlled by us. If such resolutions as these are adopted and carried into effect, I believe that this gathering will prove a great blessing to all mankind.

DISCUSSION

DR. J. A. MURRAY, London: May I say just one word on a point brought out by Dr. Bastianelli and Dr. Blumenthal in their papers? I think that it is very significant that where the deaths from cancer are the highest the reported increase is least,—and Dr. DuBois pointed out there had been no increase at all in Switzerland, with a cancer death rate standing at 125 per 100,000. When this is contrasted with the increase of 30 per cent in the United States in the 10-year period 1914–1923, it looks as if the Swiss figures may represent more truthfully the cancer mortality than do those of countries with lower rates.

But in all these considerations of the reported increase of cancer, I think we must realize that the total mortality is a thing which is made up differently in the different countries. It is a remarkable thing that in so many distinct communities in which the mortality referred to the different organs varies so widely, the total should correspond so closely. In England, for example, cancer of the uterus has been at a standstill for many years, and nevertheless we have an increasing total mortality; so that we have to consider not merely the factors which can be responsible for the increase of cancer as a whole, but the limiting conditions for the different organs varying in the different countries.

DR. HOWARD C. TAYLOR, New York City: I think that in the series of papers we have heard yesterday and this morning we have had a splendid report of the work for cancer control throughout the world. It is interesting that so many countries are doing this work and doing it in very much the same way. They have the same problems.

I was struck with the statement of Sir John Bland-Sutton about cancerphobia in England. We have it here, though it is being replaced by a desire to know the real facts,—an intelligent demand for correct information. The book by Dr. Childe, *Cancer and the Public*, first published under the title *The Control of a Scourge* because the publishers would not use the word "cancer" in the title, is an excellent one for the lay reader. This shows the change in the attitude in England about the use of the word "cancer." Now it is much more used than in the past. The same is true here. The newspapers are willing to take the material given to them, and facts are beginning to be called by their proper names.

The description of cancer centers in France is interesting. In America there is excellent surgery done in all parts of the country even in the small towns and it is probable that most of the surgery for cancer will continue to be done near the home of the patient. It would not be practical in America to have cancer centers in sufficient numbers to take care of all the cancer cases.

Dr. Howard Lilienthal, New York City: This morning Dr. Bastianelli accentuated the aspect of biochemical and similar factors as possibly important in the production of cancer. You will also recollect that Sir John Bland-Sutton, in speaking of remedies for cancer which may seem to be effective, particularly mentioned vaccines and toxins.

It seems to me that we should not permit this Symposium to close without giving attention to the use of toxins in certain forms of malignancy, notably the sarcomata. Merely in the hope of starting discussion, I would say that I have long been interested in the treatment of sarcoma by means of the erysipelas toxins of Coley. I am not prepared at this time with statistics, but I will say that my proportion of good results, which can be described only as cures, has been considerably greater than the modest percentage claimed by Coley himself. I believe that in the future we shall have a better understanding of the use of foreign proteins of this type in the treatment of malignancy. There is manifestly a great advantage in employing an agent which has an effect upon the entire organism instead of in conjunction with the various radiation agents which act merely locally.

Prof. William de Vries, The Hague: I should be glad to make a few remarks on the increase of cancer. If you were to ask me if cancer has increased, I should say that I do not know if it has really increased or has only apparently done so; but I wish to give a few arguments that may be used in the direction of a real increase of cancer. Tomorrow I will show a diagram of the cases of cancer in my country—Holland. We have the figures on cancer in general from 1867 to 1924. In 1867 the frequency of cancer per 10,000 inhabitants was 3.4. This has increased until the figure of 11.2 per 10,000 was reached in 1924. The diagram shows that the increase has taken place very regularly. And so I think the form of this curve may indicate a real increase of cancer in our country.

The second argument is this: It was mentioned by Dr. Hoffmann in his book on statistics that Walshe, commenting on the increase of cancer in London, said that the seeming increase might be produced by a decrease in the deaths from infectious diseases and by better diagnosis rather than by a real increase in cancer. This, you see, is the same argument that is used at present to account for the increase in the official death rate from cancer. It was used a hundred years ago in the same way as at present. If I remember rightly, of 1,000 deaths 6 were brought about by cancer. At present in my country, of 1,000 deaths, 114 are brought about by cancer. The same argument that was used to show that 6 deaths out of 1,000 were brought about by cancer is used when this mortality has increased to 114 per 1,000. I should say that this reported increase meant a real increase.

I have a third argument: In looking in the literature for comparison between correct diagnosis formerly and at present, I found only one publication where the clinical diagnosis in two periods of 15 years was controlled by autopsies, and there was scarcely a difference between the two periods. So I am not inclined to think very much of this increase of our knowledge in cancer when we have to do not with beginning cancer but with cancer that has caused the death of the patient. That is my third argument.

Considering the influence of reaching a greater age, that is, whether an increase in cancer is the price we have to pay for longer life, I have only to say that for my country this has been worked out by our statistician Professor Stuart and by Professor Deelman, and both have come to the same conclusion,—that the increase of cancer cannot be attributed to age incidence of our population. So, if you ask me about the increase of cancer, whether it is real or only apparent, I don't know. I only want to give a few arguments for the opinion that this increase may be at least partly real, and not only apparent.

Dr. Isaac Levin, New York City: I wish to go on record in two matters of great importance to the future of the cancer problem, in connection with the paper of Dr. Blumenthal and the following remarks of Dr. Taylor.

Dr. Blumenthal presented the situation very clearly, and his conclusions are true, not only for Germany but for the rest of the world. I refer to his statement that the medical profession, and particularly the surgical specialists, maintain that the diagnosis and therapy of cancer do not constitute a specialty, and that a well equipped general hospital is fully capable of taking care of cancer patients. This in spite of the fact that specialization in medicine is drawn so fine today that, for instance, we not only have laryngologists, but tonsilologists and special tonsil hospitals.

It is impossible to conceive that cancer, a chapter in medicine which presents the most complex and difficult problems as regards research, diagnosis, and therapy, is not a specialty. While admitting that an individual surgical clinician of experience may be able to take care of any cancer patient in a correct manner, I wish to show the many reasons which make the organization of special cancer institutions or hospitals indispensable. Such cancer institutes must not only take care of cancer research but also actively care for and treat cancer patients. I shall indicate a few of the reasons why the establishment of cancer institutes is the most important step in the solution of the cancer problem.

1. At present there is no question but that the great majority of lay people fear the knife and hope that their particular cancer—and many of the cancer patients suspect, if they do not actually know, that they suffer from the disease—can be cured by another remedy than surgical intervention.

In the course of many years of clinical work at the Montefiore Hospital and particularly at the New York City Cancer Institute, which is known to be a clinic and hospital for cancer patients only, I have made over and over again the following observation: A cancer patient who has refused to be operated upon at the advice of a general surgeon and has entered the Institute with the hope of finding another remedy, readily undergoes the operation when so advised at the Institute. On the other hand, if recognized cancer institutions were non-existent, this would play into the hands of commercial establishments like the Koch Cancer Foundation, and many similar fake organizations which actually advertise their antitoxins, serums or what not, and claim to cure all cases of cancer. They bear pseudo-scientific names, claim to have special scientific departments, have physicians' names on their literature, which simulates in form real medical literature, and use all the slogans of scientific institutions. If scientific medicine refuses to maintain cancer hospitals and cancer institutes, then cancer patients will be thrown on the mercy of these quack institutes. That is undoubtedly a very important reason for the establishment of cancer hospitals.

2. Another reason for having cancer hospitals and cancer institutions is the educational influence which their mere existence would exert on the general public. The fact that a number of scientific institutions are organized for the treatment of cancer will impress the public as proof that cancer cannot be a hopeless condition, since otherwise there would exist only homes for incurables to which cancer patients would be sent to die.

3. The third and most important reason for such institutes is the following. A few surgeons of experience may know all the phases of clinical cancer. But the profession at large, in my estimation, recognizes only the late hopeless stage of the disease and misses the early hopeful stage, with a resultant pessimistic attitude toward the whole problem. Unfortunately, I find it to be true even when it concerns the physicians' own families. A young surgeon who obtains his training in a fully equipped cancer hospital and clinic has an opportunity to see, alongside of one another, all types of cancer patients.

In conclusion, I want to say that the public as well as the profession must realize that even 30 per cent of success, which was mentioned today, is after all not a hopeless situation. An epidemic of influenza with pneumonia gives a lesser percentage of success. The laity and the medical profession must be impressed with the fact that cancer is not always a hopeless condition. Since this is so and a cancer hospital must be considered a necessary part of scientific medicine, then it is my conviction that it is necessary to call a spade a spade, and that the public must be educated not to be afraid of the name of cancer, but must be frankly told, if that is the fact, that they have cancer, and that cancer in the very early stages can be eradicated as easily as any other disease.

Prof. J. Maisin, Louvain: I agree with everything that has been said in favor of the organization of cancer hospitals.

Dr. LeRoy Long, Oklahoma City: There are certain things in connection with the control of cancer about which we all agree. We agree that it is a good thing to make a proper investigation, and that such investigation should be made early so that everything possible may be done to save the life of the patient. We seem to be in agreement about suspicious signs and about the desirability of early treatment.

We are in agreement about the clinical aspects of cancer, but do we sufficiently emphasize the importance of research in our effort to determine the essential cause of cancer? I believe that the time has come when a great organization like this should support more actively the cloistered individual who is dedicating his or her life to the investigation of this problem of humanity. We ought to throw off our preconceived ideas and, without fear, wait for the truth to be demonstrated, and while we wait we ought to support actively those who are making the investigations.

Throughout the history of medicine advancements have been made in the face of lethargy and opposition. Too often the labors of those engaged in the elucidation of great problems have been recognized only after they were dead. Only a few, like Pasteur, have been able to weather the scorn and lethargy and fierce opposition, and to receive late in life the open confidence of the profession.

In connection with the cancer problem, valuable work has been done by the Rockefeller Institute and other organizations in this country. Work of remarkable value has been done by many institutions and individuals all over the world. But when we come together to talk about cancer we do not hear much about it. If we only consider the work of Maud Slye and what it may well mean, accepting only the truths that she has established beyond question, we have a striking demonstration of the value and far-reaching influence of the investigations made by the trained laboratory worker.

"After all and above all, Truth carrieth away the victory." Let us educate the patient to have an investigation of a suspicious condition. Let us study the case of every patient and give the best treatment we can in our crippled empirical way—and that is now all we can do—but let us at the same time unselfishly support the men and women who are trying to find the truth about this scourge of humanity so that we shall be able not only to tell the patient that he has cancer, but at the same time be able to tell him why he has it.

Miss Maud Slye, Chicago: I was happy in listening to Professor Bastianelli to hear that in Italy also work is being done on the "constitutional influence" upon cancer. Back of the constitutional influence we must all agree lies, at least in part, the tremendously important factor of heredity.

There are two points that I wish to make: the first is in regard to statistics.

The statistics of the laboratory can be completely manipulated. Since it is possible by the genetic method to analyze the genetic possibilities of every animal under study, it is possible to know what each one is going to do in the way of transmission of inheritable characters. After I have analyzed these animals by the genetic method (as I have analyzed every animal appearing in my reports), it is possible by proper mating to get whatever statistics we want. If we desire 5 per cent of cancer incidence in the laboratory in two generations, it is possible to secure it. If we want 90 per cent in two generations, it is possible to secure 90 per cent. I can hold cancer off for as many generations as is desired, and can then produce it in the next generation by the right selective mating of the right individuals analyzed so that they can be depended upon to do what is expected in the transmission of cancer.

I wish to suggest that in the human species, unless we assume that man is unrelated to other forms of life and stands in a class by himself, some of the fluctuations in human statistics are due to the fact that we pay no attention whatever to genetics in the species man.

The second point: There are, apparently, two factors necessary to produce cancer: first, an inherited susceptibility to the disease, and, second, irritation of the right kind and in the right degree applied to the cancer-susceptible tissues. For example, in these mice that inherit susceptibility to spontaneous breast cancer only, cancers do not occur from irritations other than those applied to the breast tissue. In this laboratory the same type of irritation applied to various strains of mice produced entirely different results. One type of irritation studied was a wound on the face, leg, neck, or tail, caused by a cutting blow from a cage door.

1. If the mouse is a member of a non-cancer strain, such a wound produces only scar tissue which eventually is partly or wholly absorbed, leaving no bad results.
2. If the mouse is a susceptible member of a breast carcinoma strain, no tumor arises if the breast tissues are not injured by the blow. Normal healing takes place. If the breast tissues are injured by the blow, cancer arises at the point of injury.
3. If the mouse is a susceptible member of a strain carrying any type or types of internal tumors, either thoracic or abdominal, but in no other locations, such a blow produces no cancer, unless it injures the susceptible thoracic or abdominal organs.
4. If the mouse is a susceptible member of a sarcoma strain carrying subcutaneous tumors, such a blow generally will be followed in brief time by a rapidly growing sarcoma at the site of the wound.
5. If the mouse is a susceptible member of a strain carrying squamous cell carcinoma of the skin, such a blow will often occasion squamous cell cancer of the skin in the region injured.
6. The experience of this laboratory has seemed to indicate that even susceptibility to skin cancer is localized. This means that if a mouse susceptible to skin cancer of the face is struck anywhere except on the face, normal healing occurs. If the mouse is struck on the face with exactly the same type of blow, face carcinoma or sarcoma (according to which kind of susceptibility the mouse carries) will occur at the site of the injury. A notable case of this was Mouse 7,618, a member of a strain carrying both carcinoma and sarcoma. When she was struck on the face by a cage door this mouse developed a carcino-sarcoma at the site of the injury.

I bring up these two points at this time as perhaps of interest to you.

CANCER OF THE STOMACH

By DONALD C. BALFOUR, M.D., Rochester, Minnesota
Professor of Surgery, University of Minnesota, Graduate School of Medicine, Minneapolis

CANCER of the stomach can be cured by removal of the growth in an early stage of the disease. This must be the keynote of any campaign to lessen the number of deaths from this disease. Unfortunately the conditions which make cure possible are too infrequently met with, and many victims die unnecessarily, because there was a time when the cancer could have been recognized and even eradicated. The basis, therefore, for the successful treatment of cancer of the stomach, as for the treatment of cancer anywhere in the body, is early recognition.

The next essential in the prevention of unnecessary deaths from cancer of the stomach is to obviate the delay which ensues between the diagnosis and the institution of the one measure, namely, surgical treatment, which gives any prospect of cure. It is these two phases of the subject which I shall discuss briefly.

The difficulties in recognizing cancer of the stomach, or, in fact, cancer of any of the intra-abdominal organs, are greater than those met with in the diagnosis of lesions which can be seen or felt or which give rise to early and pronounced symptoms. Until recent years little progress toward the earlier recognition of cancer of the stomach had been made. A very marked advance took place with the realization, unfortunately not as yet general, that the textbook description of cancer of the stomach has done more harm than good as far as early diagnosis is concerned, since such descriptions are of the late stages of the disease when treatment rarely affords any promise of permanent relief. The early clinical manifestations of cancer of the stomach are often slight and may be entirely lacking. If it can be impressed on the public, as well as on the profession, that cancer of the stomach may exist without pain (in fact, it is very rarely associated with pain at any stage), without indigestion, without loss of appetite, without loss of weight, and without anæmia, much will be accomplished toward the earlier recognition of the disease. If it is true that cancer of the stomach may actually be present with few or no signs on clinical examination, have we any other method at our disposal which will make it possible to recognize the disease before it has given rise to pronounced symptoms?

Fortunately such a method is available, namely, examination by the roentgen ray; and it is safe to say that it is the greatest contribution which has been made to the earlier diagnosis of cancer of the stomach. It is now more important than all other methods of detecting the disease. The competent roentgenologist can disclose by fluoroscopic examination the smallest cancers of the stomach, regardless of their situation. The medical profession has been slow to recognize the importance of this fact and also has not been fully aware that incomplete clinical examination and prolonged observation to determine whether or not cancer of the stomach is present have done immeasurable harm because of the fatal delay in those cases in which the symptoms did not justify a diagnosis of cancer. The American Society for the Control of Cancer, in instructing the public in the facts about cancer of the stomach, may well urge the inclusion of a fluoroscopic examination by a competent roentgenologist in the investigation of any digestive disturbance after one has reached the age of thirty-five. The campaign for periodic health examination has at least the virtue of emphasizing the importance of complete examination.

The two lesions of the stomach which are worthy of consideration are cancer and ulcer; and when it has been demonstrated by roentgen ray that a lesion is present in the stomach, there are three chances out of four that it is cancer. This loss of time between the discovery of the lesion (or the strong suspicion that it exists) and the carrying out of proper treatment is rather difficult to explain. The human instinct to disregard or minimize the significance of minor symptoms, often because of the fear that some serious trouble will be found, together with the disinclination of the physician to assume his full responsibility, and the errors in advice to patients, particularly in counseling or agreeing to delay, all contribute to deny the patient the best chance for a cure. I believe that the American Society for the Control of Cancer will be directly responsible for saving many lives and much suffering if these points are repeatedly emphasized.

A third fact which the Society might well include in its teaching is that an ulcer of the stomach not only may be a precursor of cancer but may actually be a cancer at the time it is depicted by the roentgen ray. It is well known, because it has been proved innumerable times, that the site of chronic irritation at any point in the body may ultimately undergo cancerous degeneration. This fact is applicable to ulcers of the stomach. We frequently find, therefore, a lesion of the stomach which has every appearance of being ulcer, but which on removal and careful microscopic examination proves to be cancer. It is quite unnecessary to discuss whether such an ulcer has become cancer or whether it was cancer from the beginning; the fact remains that judging by roentgen-ray and clinical evidence it behaved as a benign gastric ulcer and differs from such a lesion in that in its further course it acts as a cancer which, if not removed, will take the life of the patient. Fortunately gastric ulcer is a comparatively rare disease; and it is also fortunate that duodenal ulcer, which is ten times as common as gastric ulcer, practically never develops into cancer. The point, therefore, that the removal of gastric ulcers will contribute largely to the control of cancer of the stomach should be included in the educational campaign of the Society.

At the present time the only known treatment that offers any promise to the patient with cancer of the stomach is surgical. It is from the results of surgery, therefore, that we can determine what can be accomplished by treatment; and it is from surgical experience that we can acquire impressions which should be valuable in improving the situation as it now exists.

In the Mayo Clinic we have seen over 6,000 cases of cancer of the stomach since 1910, and in 50 per cent of this number it was considered advisable to explore the stomach to determine whether or not the growth could be removed. In 40 per cent of the cases thus investigated it was found that the growth could be removed. In 22 per cent it was found that gastro-enterostomy could be performed, and in 38 per cent nothing more than exploration was done. The prospect of permanent cure after removal of the growth depends largely on the extent of the disease.

When the cancer was confined to the stomach and the lymph nodes were not involved, 53 per cent of the patients were found to be alive and well three years after the operation. When the disease had spread into the lymph nodes only 20 per cent were alive and well three years after the operation. The removal of the growth is frequently undertaken as a palliative measure when it is quite obvious that the disease cannot be cured because of involvement of the liver, some other abdominal organ, or of the lymph nodes in the supraclavicular space. Such palliative operations are occasionally followed by long periods of good health, and under favorable conditions they are very well worth while.

Gastro-enterostomy may give extraordinary relief to some patients if the outlet of the stomach is markedly obstructed, and may be followed by a considerable period of complete relief from symptoms. The apparent cures which have followed the operation of gastro-enterostomy for an obstruction at the outlet of the stomach, thought to be due to cancer, are explained by mistakes in diagnosis. It should also be appreciated by those interested in the control of cancer that an absolute diagnosis of cancer should never be made unless the tissue removed from the growth or adjacent lymph nodes had been pronounced cancerous by a competent pathologist. This fact is very little considered by those who claim cures for cancer.

The risk of surgical removal of cancer of the stomach approximates 10 per cent, but the safety of operation is very much enhanced by carefully preparing the patient for operation, controlling the symptoms of obstruction, and building up the general condition of the patient by suitable diet, the administration of fluids, and, if necessary, by transfusions. Under such circumstances the operative mortality of partial gastrectomy for cancer may be maintained at 5 per cent.

Important facts to be brought home in a campaign of educating the public on the subject of cancer of the stomach are: (1) The best prospect for an early diagnosis will come from constant emphasis of the deceptiveness of cancer because of the mildness and indefiniteness of its symptoms; (2) chronic gastric ulcer is the only definitely known cause of cancer of the stomach; (3) the roentgen ray is the most valuable means we have of diagnosing intragastric lesions, and the accuracy of the method in competent hands is about 97 per cent; (4) when a lesion is demonstrated, there are three out of four chances that it is malignant; (5) surgical treatment offers the one and only hope of cure, and (6) in the early stage of the disease adequate removal offers a good prospect of permanent cure.

DISCUSSION

Dr. Charles H. Mayo, Rochester, Minnesota: This meeting is a gathering of the allies of the whole world to fight cancer. The public control of cancer and the medical control of cancer can be accomplished only when all men are informed concerning its principal cause and its cure. Dr. Bloodgood's paper will, I am sure, give a comprehensive outline of what has been accomplished in the last few decades in the control of cancer.

If patients with cancer are not seen early when there is a possibility of cure, death, unlike death from acute infections, drags slowly, sometimes through years, before the struggle, first for cure, then for relief from pain, ends.

While this meeting was not expected to be productive of much that is new with regard to this all-important subject, we shall nevertheless profit greatly by our discussion together of even the little things that may have a bearing on the problem, and we shall go away inspired by the feeling that all the world is united in the attack against the disease.

Since our knowledge of cancer is as yet so incomplete, our criticisms of methods of investigation must be constructive rather than destructive, and it behooves us to investigate with open minds all new methods attacking the problem. Even most unpromising hypotheses may develop into an idea worthy of consideration. I would even go so far as to observe the methods of the so-called cancer quacks. As Sir John Bland-Sutton said yesterday, "We do not care who brings out something new if it only brings the cure of cancer."

Sir John also referred to Paget's opinion that if people lived long enough they would eventually have cancer. There lies the explanation for the increase in cancer, if it is on the increase. In 1850 the expected length of life was 40 years, in 1875 it was 45, and now it is 58. Much of this prolongation of life can be fairly credited to the direct work we have done in the control of disease and to the education of the public. The increase in cancer is thus the inevitable result of the progress of medicine generally.

The influence of heredity on cancer has been much debated, but heredity is not immune to adverse influences any more than soil is. One can see changes in the soil of the abandoned farms in New York. The way the individual lives may undo the good that he has inherited. Experiments have shown that irritation will so stimulate cells as to render them susceptible.

We often see the influence of heredity illustrated in our patients. I recall a brother and sister who were patients in our hospital at the same time with cancer of the ascending colon. One of them was 45 and the other 51. The mother and one sister in the same family had died of cancer in the same part of the colon. I was thinking of these four patients when Miss Slye was reporting that there was some difference in the biochemical condition of the disease in the ascending and descending portions of the colon.

The advocates of such quack treatment as Dr. Levin has mentioned are difficult to deal with. They publish their own journals, in a form similar to the regular medical journals. They insist that they are not maintaining secrecy and yet the whole truth about their methods is not published. I believe that these men start out honestly and are even inspired by a great hope. They believe in themselves even after they have forsaken the ways of truth, and science has disowned them. The land is full of these dabblers. I am constantly receiving letters offering me, for a small sum, some external application that is a sure cure for cancer.

Only 2.5 per cent of cancers affect the skin, about 10.5 per cent the breast, and about the same number the genital tract. More than one-third affect the stomach. How ignorant we are of the early signs of cancer of the stomach is shown by the fact that as great a proportion of doctors as of laymen come to us with this disease.

THE RADIOLOGICAL TREATMENT OF CANCER

By ROBERT B. GREENOUGH, M.D., Boston, Massachusetts.
Director, Harvard Cancer Commission and Huntington Memorial Hospital, Boston; Assistant Professor of Surgery Harvard University

THE treatment of cancer by X-ray and radium is a subject of such complexity and of such diversity of opinion, that an attempt to present it in detail on this occasion is impossible. I have been asked, however, to bring this subject before you to promote discussion, and that purpose I feel sure can be accomplished, for there are few subjects in which opinions differ so consistently as upon the value and the methods of application of radiotherapy to the control of cancer.

In one respect, however, medical opinion is very well united. No one today ventures to dispute the fact that the addition of radiotherapy to our resources has been of enormous benefit in the treatment of cancer. It has already modified what may be called the former standard treatment of cancer in many situations, not only in the advanced cases but in early and favorable cases as well.

It is chiefly in the details of its application, and in the estimate of its value in the manifold different types of the disease that the opportunity for differences of opinion is so manifest.

The object of this Symposium is the desire to ascertain the established facts in regard to cancer and its treatment which can be agreed upon by the eminent authorities here present, and published to an expectant public as the fundamental principles upon which the control of this disease must, for the present at least, be based. The radiological treatment of cancer must be regarded, therefore, not as a method of treatment to be advocated and defended by a partisan, but as one of several different methods of treatment, available to any group of physicians or surgeons engaged in the treatment of this disease. It rests with those who are called upon to deal with the individual case of cancer to select that method of treatment, whether it be by surgery, by radiation, or by other methods, or indeed by any combination of these measures, which will yield to the individual patient the best results. It is in this spirit that I would present for your consideration the resources which have been added to the armamentarium of those engaged in the treatment of cancer patients by the development of radiotherapy.

With your permission and for the purpose of this discussion, we will assume that certain facts in regard to cancer are established: namely, that cancer is a disease of the cells of the human or animal body, which arises in a single location, and is characterized by a progressive growth of those cells, first locally and later by transfer through the blood or lymph vessels or by other routes to more distant parts. As a rule it is this tendency to the transplantation of the disease to deeper and more remote parts of the body which in late cases prevents the effective use of surgical or other methods of eradication of the disease, and it is usually the interference with vital functions produced by these internal and remote developments of the disease rather than the primary local growth which causes the death of the patient.

Although the above statement may be accepted as a reasonable picture of cancer in general we must not lose sight of the fact that the broad term "cancer" covers a multitude of different conditions, varying in anatomical situation, in manner and in rapidity of growth and of extension, and thus varying also in the extent to which they may be affected by therapeutic measures directed toward the amelioration or cure of the disease.

Before the application of X-ray or radium to the treatment of cancer, surgical measures which aimed at the removal or destruction of the disease were the only effective methods of treatment, and in too many instances were employed without success in advanced cases for the simple reason that no other treatment was available. Under these circumstances the few successful surgical removals of the disease formed so small a proportion of all cases operated upon that a high degree of pessimism developed not only among the laity but in the medical profession as well in regard to the possibility of cure by operative measures.

Since the advent of radiotherapeutics this situation has changed. Many painful, dangerous, and ultimately useless operations have been avoided and a more rational method of treatment substituted, which is greatly to the benefit of the patient afflicted with this disease. This fact alone would amply justify the development of radiotherapy, although this is only one of the many ways in which radiation has contributed to the welfare of the patient.

A technical discussion of the effects of radiation on living cancer cells and upon the surrounding normal cells of body tissues would here be out of place. We have as yet little accurate knowledge of the exact methods by which alterations in the rapidity of growth and in the specific functions of cells are brought about by the radiations of radium and of X-rays. We do know that under the influences exerted by the absorption of these penetrating radiations, profound changes in the cells occur which may be carried even to the point of their death and destruction with sufficient dosage.

There are, roughly, two entirely different effects that can be obtained by radiotherapy, each of which may be of service in the treatment of cancer. The first effect is that of a retardation of growth without of necessity producing the actual death of the tumor cell. This is the remote effect which represents so unique an advance in our resources in dealing with the deeper manifestations of cancer. It is probable that this effect is produced in part by direct action on the tumor cell and in part by the changes produced in the surrounding tissues. It is certain that prolonged radiation leads to a diminution of the local blood supply and to the production of a degree of scar tissue formation about the tumor which tends to encapsulate the tumor cells and deprive them of their necessary circulation. No one who has had occasion to operate in a region of the body which has been exposed to prolonged radiation can fail to have been impressed with the diminished vascularity and the increased scar tissue formation in the tissues so exposed.

The second effect is the caustic destructive effect of radiation. This is a very positive effect obtained by the intense exposure of tissues to radiation and one which in certain regions has definite advantages over other destructive agents, such as the cautery. Cancer of the cervix is an example of a region in which this effect can be employed to advantage, and in other regions of the body the destructive effect obtained by the radiations of radium or X-rays may often be employed with more accuracy and with less discomfort to the patient than by other surgical measures.

Two other effects of radiation upon living tissues have been described: one is that of stimulation of growth which is supposed to be produced by very minute doses of radiation; the other is a degree of modification of growth such that cells which are abnormal in their growth or function may be influenced by suitable radiation to return to a more normal behavior.

The possibility of stimulation has been much discussed. Radiations of X-ray or radium cannot be supposed to supply any factor necessary to cell growth, such as heat, sunlight, food, or moisture. It is probably only by temporary interference with some normal cell function from which recovery later ensues, that an apparent stimulation can occur. Such a phenomenon has been described in the radiation of paramœcia by Bovie. Whether such a condition is encountered in the treatment of cancer by radiation is perhaps open to discussion, but it is the accepted belief in our clinic at least, that minute doses of radiation are of little benefit to the patient and may increase the rapidity of development of the disease.

The modifying effect upon cell growth is again a subject of some discussion. So far as minor proliferative changes of the precancerous type are concerned, such as are seen in the keratoses and papillomata, it is probable that some such effect is present. Certainly from clinical experience we find that lesions of this sort are so affected by non-destructive doses of radiation as to disappear without appreciable scar. When we attempt to modify the cells of established metastasizing cancer, however, by such non-destructive dosage the effects are all too often temporary and the disease recurs.

In this respect non-destructive radiation, whether it is applied on the surface of the body or by deep penetrating radiation, produces much the same effect; i.e., a retardation of growth, with some modification of cell function and degeneration. This effect lasts for a longer or shorter period, but eventually almost always disappears and the disease continues its course.

In addition to these local effects of radiation certain other phenomena should be mentioned which have a bearing upon the subject. In the first place definite constitutional effects can be produced by large doses of penetrating radium. These fall into two classes, acute and chronic. The acute immediate effects, "roentgen sickness," or constitutional radium reaction, are usually very transient, and consist of prostration, anorexia, nausea, and vomiting. The more chronic effects are evidenced chiefly in the blood picture by a hypoleucocytosis, especially as regards the lymphocytes and by varying degrees of diminution and abnormality of the red cells.

Another factor which is of prime importance in radiotherapy is that of the susceptibility of the different cells of the human body to radiation. There is no doubt that certain of the more highly differentiated cells of the body, of which the ovarian and testicular cells are the best examples, are more readily vulnerable to radiation than are those of the connective tissues. Many attempts have been made to demonstrate that cancer cells were also more vulnerable than normal body cells, but if we make due allowance for the fact that the cancer cell is already a "sick" cell and one more prone to early degenerative changes than the normal cell, we find that their supposed susceptibility is not so evident as we should like to see it, and in certain tumors a resistance to radiation even greater than that of normal tissue is occasionally encountered.

Again, the fact that cells in process of cell division are especially affected by radiation has been well established, and on this account the cells of tumors of extremely rapid growth are often affected by radiation more than those of slower development. It is unfortunate, however, that this susceptibility is not a lasting one. All tissues appear to lose their sensitiveness to radiation with repeated doses, and it is not uncommon to find a marked response and retrogression at the first radiation, which is not so evident after the second and third doses, and may be entirely absent after further radiation.

All of these facts must be borne in mind in the discussion of the value of radiation in the different forms of cancer.

Perhaps our purpose will be best served if we consider the application of radiotherapy to certain different types of malignant disease as illustrations of the different conditions under which the application of radiation may be of benefit. It is probable that the best example of the destructive effect of radium in the treatment of cancer is supplied by cases of cancer of the cervix of the uterus. In this disease the attempt to destroy the disease by the caustic effects obtained from the β- as well as the γ-rays of radium, is commonly employed, although it must be conceded that the more remote effects of the penetrating radiation of the γ-rays of radium or of the deep X-ray may also be of service.

Cancer of the cervix is to a very great extent a local and regional disease, in that it spreads to the more remote portions of the body only in its later stages.

Locally, however, by direct infiltrative growth and by extension to the regional lymph nodes as well as to the anatomical structures in the immediate neighborhood of the cervix, its extension from the point of origin is of relatively early occurrence. Again, the close anatomical relations of the uterus to the bladder, ureters, rectum, and the structures in the broad ligaments prevent the wide anatomical dissection and removal by surgical operation which could be desired. It is for this reason that the operative treatment of cancer of the cervix by the Wertheim type of operation is attended by so high a mortality, such frequent undesirable postoperative complications, and such relative lack of success.

Under these conditions the possibility of the application of radium to cases of cancer of the cervix offers many advantages.

With sufficient dosage the destructive effect may destroy all of the disease and result in just as lasting a cure as can be obtained by operation.

In a series of 243 proved cases of early and borderline cancer of the cervix (all over 3 years after operative treatment), collected by a committee of the American College of Surgeons from 22 clinics, hysterectomy cured 1 in 3 with a mortality of about 1 in 5, and radium cured 1 in 5 without mortality. The choice is thus an open one as between radiotherapy and operation, but in the past 5 years, as radiation technique has undoubtedly improved, medical opinion has been turning more and more definitely toward radiotherapy as the best treatment for this disease in all its stages. In this connection, a fact of great importance is that cases treated with radium, even if unsuccessful as regards the cure of the disease, have received the best known palliative treatment for the relief of the local condition; whereas the operative failures are, as a rule, made worse rather than better by the operative treatment.

When it comes to the treatment of advanced cases of cancer of the cervix, it is generally admitted that radium by local application is far superior to any other known method of treatment. I cannot speak from experience in regard to the use of extreme dosage of high voltage X-ray. The number of cases that have been subjected to this treatment in the Huntington Hospital is too small to permit reliable conclusions, but we have not been encouraged to think that high voltage X-ray compared in any way with the local application of radium for the relief of the local condition in advanced cases.

It must be remembered also that cancer of the cervix anatomically provides an ideal field for the application of destructive radiation. The fibrous tissue of the uterus exposed to the destructive effect of the radiation forms an excellent filter for the protection of the surrounding tissues from over-radiation. It is for these reasons that the treatment of primary cancer of the cervix in many clinics in this country is now carried out almost exclusively by radiotherapy.

Other forms of cancer are also suitable for treatment by the destructive application of radium. In many of the superficial types of cancer about the face, radium is the treatment of choice in many cases. When we are dealing with metastasizing cancer, however, destructive radiation has proved in our hands an inadequate method of treatment for metatases in the regional lymph nodes. Complete surgical removal appears to be the only method by which malignant disease of the regional lymphatics can be actually cured. This is accomplished, of course, over and over again in operations for cancer of the lip or cancer of the breast. In some clinics the use of radium by implantation in regional lymphatics is combined with surgery, whereas in other clinics reliance is placed upon a more extensive surgical dissection which leaves no tissue into which radium can safely be implanted. In many situations, also, the palliative benefit from destructive radiation, either by the direct insertion of radium needles or by surface application, can be obtained in cases where a cure of the disease is not to be expected. As examples of cases in which this form of treatment may be of service to the patient, I would mention the more advanced cases of cancer of the mouth, tongue, pharynx œsophagus, and rectum. In such cases, however, the addition of X-ray therapy is usually to be desired.

Apart from the destructive effects of radiation, the retarding effect of X-ray or radium therapy upon the growth of cancer is beyond dispute. This is obtained as a rule by the employment of X-ray or by screened treatments with radium which permit only the γ and the harder β rays to reach the tissues. This is the remote effect of radiation to which reference was made above, and although its benefits can be demonstrated without question in certain cases it must be admitted that these benefits are of a less permanent character than was at first supposed. It has been very difficult to obtain accurate statistics in regard to cases of this nature, partly because there were no standards by which the results of treatment could be compared with untreated cases, and partly because complete records of large series of cases have not been available.

In a study which has just been completed of a series of cases of cancer of the breast at the Huntington Hospital some interesting facts have come to light. One hundred twenty-seven cases were studied, that entered the hospital in the years 1917, 1918, and 1919. Of these, 42 were primary cases; 8 were operable, and 34 inoperable. The inoperable cases treated with X-ray lived on an average 8 months longer than those that did not have X-ray treatment.

There were 55 cases which showed recurrence following radical operation for cancer of the breast. Of these, the patients who received X-ray treatment lived on the average 6 months longer than those who did not.

There were 30 cases that showed recurrence after incomplete operation; of this number, the 15 cases that received X-ray treatment lived on the average 20 months longer than did those without X-ray. It is to be noted also that in the earlier and more favorable cases (those without evidence of internal or remote metastases) the advantages of X-ray treatment were most conspicuous. Of these more favorable cases, those given X-ray treatment averaged 60 months, while those that did not have it lived on an average only 43 months, a difference of nearly a year and a half of life for each patient to the credit of the X-ray.

This seems to be positive and definite evidence of the value of X-ray therapy in cancer of the breast, but it should be noted that of the cases here recorded which entered the Huntington Hospital prior to 1920 only 1 of the recurrent cases is now living, and that a case in which the diagnosis of recurrence in supraclavicular glands was not proved by pathological evidence. Every other case is dead with the exception of 6 of the 8 cases culled from this mass of unfavorable material as suitable for attempt at radical cure by operation. Eight cases were operated upon and 6 of these are now alive and well.

Thus we may say that cases of cancer of the breast, whether primary or recurrent after operation, derive definite and positive benefit from X-ray therapy. Life is definitely prolonged, but such cases are not cured in the sense that they are cured by surgery.

What is true of cancer of the breast is to a great extent true of other more serious types of malignant disease in regard to X-ray therapy. Life may be prolonged and symptoms of one sort or another may be alleviated, but in the end the disease develops further, response to additional radiation does not occur, and death ensues.

There are many other interesting and important matters for discussion in regard to radiotherapy. The combination of radiotherapeutics with surgery, either in the way of pre-operative radiation or postoperative prophylactic radiation, or by the surgical exposure of the disease, as in cases of carcinoma of the antrum (Greene) or by the decortication method of Beck, as a preliminary measure, to permit the more energetic and more accurate application of radiotherapy to the underlying tumor tissue—all of these methods have their advocates.

In general, however, the familiar precept of the American frontiersman, "The only good Indian is a dead Indian," is applicable to cancer. The only good or harmless cancer cell is a dead one!

By surgery or by destructive radiation we can cause the removal or destruction of cancer and cure the disease. By deep radiation of X-ray or radium we may retard its progress and alleviate its symptoms often for a long period of time, but we have no justification for expecting in many cases to obtain a permanent cure of the disease.

SUMMARY

1. It is not a question of the claims of partisans advocating this or that method for the treatment of cancer, but rather a calm and judicial appraisal that is needed of the advantages to the patient of each method and an application to the individual case of the method or methods of treatment which in it will give the best results.

2. In this spirit, an evaluation of radiotherapy indicates: (*a*) that destructive radiation in certain selected situations is capable of curing metastasizing cancer; (*b*) that many precancerous conditions can be cured by non-destructive radiation; (*c*) that deep, non-destructive radiation may retard the development of cancer and may mitigate or control distressing symptoms, but that these effects are almost invariably of a temporary rather than of a permanent character. This applies particularly to cancer involving lymph nodes.

3. The best interests of the cancer patient demand that all effective methods of treatment be made available to him, so that a judicious choice of a well-considered combination of methods may give to such a patient his best chance of cure, or, failing that, his best chance for the prolongation of life and the relief of symptoms.

WHAT IS THE VALUE AND WHAT SHOULD BE THE ORGANIZATION AND EQUIPMENT OF INSTITUTIONS FOR THE TREATMENT OF CANCER BY RADIUM AND X-RAYS?

By Professor CLAUDE REGAUD, Paris, France
Professor, Pasteur Institute; Director, Laboratory of Radiophysiology of the Radium Institute and of the Therapeutic Service of the Curie Foundation, Paris

IT is not very long since the cure of a patient suffering with cancer depended only on the possibility or the impossibility of a radical surgical operation. If the surgeon recognized as possible the total and wide ablation of the territory invaded by the disease, the patient had a chance to recover. In the contrary case, he had no such chance. All that remained was to employ remedies to relieve the pain and sometimes to perform an operation designed either to stop a hæmorrhage or to overcome the obstruction of some organic passage indispensable to alimentation or excretion. At that period the treatment of cancer did not demand the collaboration of any other than the family doctor and the surgeon.

I.—CHARACTER OF THE "TEAM WORK" GRADUALLY ACQUIRED IN ANTI-CANCER THERAPY. CONCENTRATION OF PATIENTS, PHYSICIANS, AND MATERIAL MEANS IN SPECIAL ESTABLISHMENTS

A. The Association of the Services of Experts

Attempts to cure cancer patients by general medical means or biological or chemical treatment are now made in all countries. The net benefit from these efforts, while not entirely negative, is of very little importance. It is evident that scientific investigations in this direction ought to be encouraged, but it is necessary to discriminate carefully between these and the work of charlatans, against whom it is proper to warn the public and members of the medical profession. It is desirable that the establishments which we shall discuss in this paper devote a part of their activity to these investigations, but this branch of anti-cancer treatment does not demand at the present time any particular organization.

X-rays and radium, on the contrary, have taken on a growing importance during the last 20 years. At first they had only the modest end in view of relieving the pain of inoperable patients and prolonging their existence. Later on it became possible to obtain such favorable results that even operable cases belonging to certain pathologic species and to certain localizations in the body could be taken care of without surgery, at first exceptionally and later on quite regularly. In contrast with the slowness of the progress of surgical methods, the last 10 years have seen the rapid march of radiologic methods. The result is that the surgeon, in the rôle of operator, is no longer the sole arbiter of the eventual cure of cancer patients. Experts who have specialized in the handling of X-rays and radium have taken part, along with the family doctor and the surgeon, in the councils before which (theoretically at least, for in practice this is, unfortunately, far from being always true) the case of every patient ought to be examined.

Even surgical methods themselves should not, it seems, remain such as they were in the old classic treatment. For example, diathermo-coagulation by high frequency currents is tending to take an important rank among procedures for the removal of cancer.

Surgeons (practicing general surgery or expert in special branches of surgery), X-ray technicians, and radiologists are the principal persons required to carry out the team work in the treatment of cancer.

Formerly it was not supposed that the executive (who was exclusively the surgeon) needed the help of any special laboratories. This is no longer the case. Histology, hæmatology, bacteriology, and physics have become very useful, sometimes indispensable, for the correct execution of radiotherapeutic methods. It may be that chemistry also will soon become important.

It is no longer necessary to justify the capital rôle of the physicist, either in the scientific research work or in the daily preparation and execution of treatments by radiation. In roentgenotherapy, he measures the output of the X-ray tube, determines the dosage received within the tissues, tests out the apparatus, etc. In radium therapy he is occupied also with the distribution of the rays in the tissues; he examines the radium tubes from time to time to make sure of their integrity; he prepares radium emanation (radon) and distributes this element in various ways according to the methods adopted by the staff.

The histologist was formerly useful, but not absolutely necessary, to the surgeon, for confirming in advance of operation an uncertain clinical diagnosis or possibly to furnish his scientific control by analysis of tissues taken from the patients. He has now become the indispensable collaborator, the true guide, of radiotherapists. Analysis by biopsy, which is carried out by him, has in fact taken on a great importance, not only for facilitating the diagnosis of malignant tumors but also for determining their species and varieties; radiotherapeutic technique is in fact frequently influenced by a detailed knowledge of their histologic characters.

The hæmatologist is of very great value in bringing his contribution to difficult diagnoses by serologic methods, and for controlling the differential blood count in patients in whom the cancer demands a strong dosage of irradiation over a very extensive region; he is needed also to watch, by periodic analyses, the blood of the radiotherapists themselves and to conduct measures of hygiene which are indispensable for preserving the health of every person who constantly manipulates radio-active bodies or X-ray apparatus.

The bacteriologist today renders very great service in analyzing and combating the bacterial infections which frequently complicate ulcerated cancers. It is known, in fact, on the one hand, that bacterial infection, when it reaches a certain degree, is an obstacle to the efficacy of radiations, and, on the other hand, that a strong dosage of rays upon an infected cancer aggravates the infection and sometimes causes formidable complications. Radiotherapy of cancers of the uterine cervix, in particular, has received benefit from bacteriology to an important degree, and, thanks to vaccination, serotherapy and chemiotherapy, which supplement the processes of classic disinfection, it has become possible to reduce the number and diminish the severity of mishaps.

From what has just been said, it can be understood that the treatment of cancer has ceased to be the work of a single man and has become that of a whole staff.

But there is no staff that can do good team work without a head to co-ordinate the activity of its members. Who should he be?

The head should be the man who understands best in their entirety the complex ensemble of questions relating to diagnosis, pathology, and treatment of cancers. If this head is master of one of the particular branches of technique—surgery, X-rays, or radium—it will sometimes be necessary for him to give up his practice and devote his entire time to his rôle of director. A doctor of clinical medicine may become the best chief-of-staff for the treatment of cancer, upon condition that he acquires the necessary insight for an exact appreciation of the indications and results of the various forms of technique. He will, in addition, be competent to assume the direction of the service of hospitalization of the patients.

The need of the collaboration of scientists and physicians having various specialties, and of the transformation of individual work into team work, thus represents one of the two causes which have brought about the appearance of special establishments dedicated to the treatment of cancer; the other cause is the necessity for assembling a complex and very costly material equipment.

B. The Concentration of the Material Equipment

The surgery of cancer does not demand an organization or an equipment of instruments peculiar to itself. If it were not for X-ray machines and radium apparatus, no need would be felt for centralizing the therapeutic material of cancer in special organizations.

When X-rays first began to be employed in the treatment of cancers, the same machines could be utilized equally well for X-ray diagnosis, for superficial treatment, and for the treatment of the few deep affections for which they were even then used. But this condition of things has changed greatly in the last 10 years.

There has come about an evolution in two opposite directions of the machines designed, on the one hand, for X-ray diagnosis and superficial therapy, and, on the other hand, for deep therapy. This evolution has been caused by the increase of potential of the electric current feeding the tubes, in order to attack deep cancers with more and more penetrating X-rays, passed through filters of increasing thickness. Two categories have resulted from this evolution.

One type (with feeble or medium potential of 20 to 100 kilovolts) is adapted to the various purposes of X-ray diagnosis and to superficial or less deep therapy, progressing especially in the direction of increased intensity of the electric current passing through the tube, for the purpose of shortening to the point of instantaneousness the duration of the pose in roentgenography.

The other type of apparatus, with potential as high as is permitted by the X-ray tubes, which are constantly being perfected (200 kilovolts and more), tends also to increase the intensity of the current (in order to avoid prolonging the sittings, which would be the result of the constant increase in thickness of the filters), but their development is most of all in the direction of increasing the potential.

These two categories of machines, with the X-ray tubes which they feed and their accessory features, are less and less interchangeable in the two branches of medical roentgenology. The installations for roentgenotherapy of an establishment specialized for the treatment of cancer have become truly a thing apart; they demand a special equipment for their utilization and for the protection of those who use them.

It must be noted that the output of even the best X-ray tubes which we possess at the present time is pretty weak with respect to rays of high concentrating power: hence the necessity of having available an adequate number of treatment tables for deep roentgenotherapy in proportion to the quantity of radium and the number of patients of any given establishment.

The multiplicity of X-ray machines, the large quarters which they demand, the personnel necessary for their use, and the high cost of such an organization—these are sufficient reasons for the concentration of such a form of treatment in powerful establishments.

During the first years of its employment, radium was measured by centigrams in the arsenal of a specialist, and the cost of a suitable amount of this substance was not too great for the financial means of a private physician. The procedures of radium therapy were at that time economical. They consisted in the introduction of tubes of radium into the natural orifices of the body and into tumors, and in the application of these tubes (or sometimes of radiferous plates) in close contact with the surface of the skin. Other economical procedures of a different nature have since been devised: such as the introduction within the tissues of bare tubes (capillary tubes of glass containing radium emanation) or metallic needles, containing a salt of radium or a capillary tube of radium emanation.

All these forms of technique are still in use, but there is another that tends to supplement and even to supplant them in an ever-increasing number of cases, namely, the application of radio-active foci at a distance from the body, either by means of supports resting upon the body, which maintain the radium tubes at a distance from the skin varying from a few millimeters to several centimeters, or by having the radium act from a distance of 10 to 15 centimeters, constituting foci that have some similarity to those of X-rays. This is how the amount of radium provided for anti-cancer therapy has passed from a few centigrams to several grams.

In the special establishments set apart for the radium treatment of cancers, apparatus for "surface treatment" is charged daily with several decigrams of radium; at the Radium Institute of Paris we make permanent use of a single focus containing 4 grams of radium, which irradiates at a distance of 10 centimeters from the skin. It is evident that this evolution in technique contributes to render the concentration of material equipment absolutely indispensable.

To sum up: the necessity of calling in for the examination and treatment of patients, men of various specialties whose work must be exactly co-ordinated; of placing at the service of diagnosis and treatment different kinds of laboratories, all well equipped; of bringing together special X-ray apparatus which is numerous, heavy, and costly to purchase and maintain; of employing large quantities of radium—all this explains adequately the recent organization of anti-cancer therapy with a view to a work that is to be accomplished by a collective staff, in special, well-endowed establishments.

It is evident that such an establishment will not have a satisfactory economic return unless it has a large clientele. Many practicing radiotherapists working alone can have only a modest supply of radium, and one that is used only intermittently. As a result "the unit of effective utilization" of this irregularly employed capital—that is to say, the weight-hour of radium employed—is very costly to them and to their patients. But in an establishment abundantly supplied at the same time with radium and with patients the economic conditions are very different, since the radium can here work continuously.

The united labors of men representing different methods, but having freely at their disposal all the material means employed in medicine for the treatment of cancer, must result in substituting, little by little, the spirit of objectivity and impartiality for that of personal specialization, which still too often animates solitary technicians working each on his own account.

What is the habitual attitude of the surgeon, the radiotherapist, or the roentgenologist toward any one of these to whom a cancer patient has applied separately? He generally looks first of all at the rôle which his own method is capable of playing. He has a tendency to overestimate the fitness of his own method. Knowing other methods but imperfectly, he measures their value only by the powerlessness of his own.

But let us suppose that these same men are used to working together. Their spirit will then be very different. In regard to each particular case, the relative value of their individual specialty will be classed according to their common experience, not, indeed, without deliberation, but without difficulty. They will cease to have for their aim the predominance of surgery, of radium, or of X-rays; such a preoccupation will seem to them even absurd; all they will care for is to obtain the best possible result by whatever means, or combination of various means, the present state of their collective knowledge leads them to prefer.

Every institution, whether it is called a radium institute, an institute of roentgenotherapy, or a surgical clinic, must subordinate the prestige of the particular therapeutic agent which has led to its own creation to the single consideration of giving patients the best treatment that the circumstances permit.

In connection with the organization of radium therapy, it is necessary to examine the utility of a conception quite different from the type which I have been discussing in the preceding pages; its essential character consists in the concentration of radium by financial associations which undertake to rent it out to doctors or to sell them the emanation. Such organizations evidently do not weaken the reasons which motivate the close collaboration of special forms of service, but, on the other hand, they constitute a very serious risk of malpractice, since they make it possible for any doctor, even though inexperienced in radium therapy, to practice it whenever he likes. One knows only too well the temptation to which each one is exposed, of reserving to himself the care of all his patients beyond the reasonable limits of his ability, not to be suspicious of an organization that is capable of rendering such a temptation more dangerous. It is a fact that in certain cities where any doctor can procure radium "upon a written order" therapeutic malpractices are observed, of which one may be permitted to say frankly that they are the evidence of veritable abuses of confidence and power.

Both of the two great factors—the services of experts and the material equipment—the combination of which justifies the centralized organization of anti-cancer therapy, are equally important. But one of them is easier to procure than the other (since money alone can get it), and unfortunately the authorities in control of the organization sometimes have a tendency to regard this as more important: I refer to the material equipment.

It has in certain cases been thought that it was enough in order to assure the establishment of anti-cancer therapy, to give the necessary funds to a good material organization and to entrust this to men who were in no way qualified for such functions (except by their good will). This error arises from the fact that as a rule people greatly underestimate the real difficulty of the radiotherapy of cancer and are easily deceived by the apparent simplicity of its operative methods. But it is not any easier to cure cancers (naturally I am not speaking of a "rodent ulcer" of the skin) by X-rays or radium than to cure them with the instruments of surgery. Nobody thinks that to make a doctor of internal medicine into a surgeon, it is sufficient to give him a case of good surgical instruments. Now it is undeniable that a medical doctor, although possessing sufficient knowledge for the correct manipulation of an X-ray machine or radium tubes, has still much to learn before he is competent to treat cancers by these methods; and likewise, a surgeon, if he has not had definite supplementary instruction and experience, cannot regard himself as qualified to practice radium therapy. Thus the value of the personnel and the experience of those who do the work surpass in importance the perfection of the material in radiotherapy as in all other branches of medicine.

II.—WHAT CAN BE ACCOMPLISHED TODAY BY THE USE OF RADIOTHERAPEUTIC METHODS IN THE TREATMENT OF CANCEROUS DISEASES?

Are the advances that have been brought about by radiotherapeutic methods in the treatment of cancer sufficient to warrant the creation of the special establishments which are necessary for their application? To answer this question, I propose to give a brief summary of the results which it is possible to obtain, and of the reasonable perspective which one has a right to see in the future for the employment of X-rays and radium in certain kinds of cancer and certain common localizations of the disease.[1]

These therapeutic agents have naturally been tried in all the manifestations of malignant diseases, but they are far from having had a uniform success and it is far from being true that the advances have been the same for all kinds of cancers.

It is in cancers having the common histologic characters of epidermic epitheliomata that radiotherapeutic methods have, up to the present time, given the most satisfactory results: that is to say, in epitheliomata of the skin, of the orifices and dependencies of the skin, and also in epitheliomata of the mucous membranes which have in their normal state (or which are capable of taking on, after a period of pathological preparation) an epithelial covering analogous to the epidermis, namely, the mouth and tongue, nasal fossæ and maxillary sinus, pharynx, vagina, cervix, etc. In this large group, which probably forms one-third of all cases of malignant neoplasms, the success of radiotherapeutic methods is likewise not at all uniform, even if one were to suppose that the technique has been applied as perfectly as it is possible to apply it today.

Cases of epitheliomata of the skin and cutaneous orifices which would be capable of cure by surgical operation give, under radium therapy, a proportion of local cures (that is to say, of cures of the primary localization) exceeding 90 per cent; cases too extensive to be operable still give, under radium therapy, an average of 40 per cent of local cures. On the other hand, adenopathies, which rather frequently complicate the epidermoid varieties of these epidermic cancers, appear to result in as many failures under radium therapy alone as under surgery alone, so that it is desirable to associate these two methods. So far as epitheliomata of the skin surfaces are concerned, radium therapy has, therefore, become on the whole, clearly superior to operative treatment, and the latter (although still necessary in the treatment of lymph-node regions) can scarcely any longer surpass the former.

---

[1] The percentages of cures indicated here are based on the works published by the Radium Institute of Paris.

The earlier cases of epitheliomata of the uterine cervix yield an equal proportion of successes under surgery and under radium therapy. But radium therapy, either alone or associated with X-rays, also cures many cases of doubtful operability and an important proportion of cases that are absolutely inoperable. In this localization, too, the superiority of radiotherapeutic methods can therefore be asserted with increasing assurance.

In cancers of the mouth and tongue, the results of radium therapy are superior to those of operative treatment, which have never been very satisfactory.

In cancers of the nasal fossæ and of the maxillary sinus, the association of surgery and radiotherapy (radium-surgery) gives results far superior to those of surgery alone.

Epitheliomata of the vagina and those of the pharynx, larynx, and œsophagus belong to the same histopathologic class as the preceding cancers. Advances in their treatment by radiotherapeutic methods are, however, less, because of particular difficulties of a local nature. Surgery cures a large proportion of cancers of the larynx, but surgical possibilities for the œsophagus are almost *nil* and are very slight for the pharynx and the vagina. There are good reasons for foreseeing very substantial progress in the treatment of cancers of the vagina, pharynx, and larynx, but one is not yet justified in saying much about them.

As for cancers of the thoracic portion of the œsophagus, their deep situation and their anatomic relationships have not up to the present time permitted any external radiotherapeutic treatments which would be effective and at the same time free from grave dangers. It is easy, it is true, to treat them by radium introduced into the canal, but, barring a few very exceptional cases, this method has not given, in the hands of the best specialists, more than palliative results.

To sum up: epidermic cancers form, in general, a class very favorable for radiotherapeutic methods. These methods have made such advances that they can with advantage be substituted for surgical removal in most cases. The explanation of the good results obtained in cancers of this class depends on radiophysiologic properties which these have in common. In some of their localizations, inherent difficulties arising from anatomic or topographic peculiarities have not yet been overcome.

In cancers of the glandular tissues, radiotherapeutic methods have been found, up to the present time, much less favorable than in skin cancers. In certain localizations (for example, the breast) the primary cancer generally spreads rapidly over a large area. The metastatic dissemination (by means of lymphatics and blood vessels) is more frequent and takes place earlier than in the most malignant forms of epidermic cancers. These properties do not accord with the necessarily local character of treatment by radiation and do not often permit taking advantage, for a definite cure, of the rather high degree of radiosensitiveness of certain varieties of these neoplasms. Cancers of the breast, so long as they are operable, should still, it seems, be treated by wide ablation of the organ and its lymphatic supply; but when they have become inoperable, or when they show signs of recurrence after operation, radiotherapy may give excellent palliative results.

In cancers of the rectum, internal radium therapy, which was at first so tempting, has resulted in only a small number of cures as against a large number of painful burns. Methods designed to attack the cancer from outside, either through the intact integuments or by radium-surgery, certainly cause the tumors to regress and may render them operable if they were not so before, but it is still doubtful whether these methods suffice to cure them. Surgical removal remains, therefore, up to the present time the best recourse.

The same is true of cancers of the stomach.

Cancers of the liver, pancreas, and lung are always inoperable. Radiologic methods produce temporary improvement.

Sarcomata present very different results according to their pathologic varieties. There are sarcomata that are extremely radiosensitive, such as lymphosarcomata and osteosarcomata of the myelogenous type: it is easy to cause the disappearance of tumors formed from these. Unhappily, they have a very great power of diffusion, resulting almost constantly in metastases that finally penetrate into the viscera and cause the death of the patient.

Other kinds of sarcomata, such as myxomata and spindle cell sarcomata, are less radiosensitive and also make metastases: these facts render them still less favorable than the preceding ones for radiotherapy. Myeloplax sarcomata do not form metastases and are readily cured. Typical malignant tumors of fibrous, bony, and cartilaginous tissues offer a mixed structure, metastasizing infrequently and slowly, but they are quite radioresistant and present very uneven results under radiologic methods.

It is evident that the progress of radiologic methods has the result of restricting the part played by surgical removal. Except in connection with epidermic cancers, which at the present time have shaken themselves free from surgical interference, the rôle of surgery remains preponderant in almost all operable cases belonging to other species. However, even in epidermic cancers, the choice of method depends in large measure on the relative value of the personal co-efficient and the material facilities by which the concurrent methods are represented at any given place and time. When confronted by any particular case, it is not enough to inquire: In the present state of science, what is the best method of treatment? Taking careful account of all possibilities, it is necessary to determine which is the way that has now, here, in this very case, the greatest chance of success.

An establishment which begins to treat cancers by radiotherapeutic methods will not, until after several years of efforts have elapsed, have a sufficient proficiency to raise its statistics to the highest level on record. And even then, in view of the fact that difficulties of a local nature are of great importance in the matter of radiotherapy of cancers, one cannot apply conclusions as to the perfection of control in one location to the same degree as in another.

From this, two rules of wisdom emerge: first, in the treatment of a species, or localization, of cancer in which surgical measures result in a large number of cures, radiotherapists of a new establishment ought to "get their hand in" by prudently choosing only inoperable cases for treatment; second, one must not substitute a new method for an old one in current practice until it has been amply demonstrated that the new one gives results at least as good as the old one.

At the Radium Institute of Paris we cure with radium about 19 cases out of every 20 of operable cancers of the lower lip, and we are not the only ones to obtain these results. But previous to the year 1921 we had all such operable cases as came to us operated upon. It was only after we had succeeded in systematically improving inoperable cases, and after we had cured a good many of them, that we gave up surgery in the treatment of the primary localization of cancer of the lip.

It is necessary to make an exact picture of the reasons for the lack of curative power today in radiotherapeutic methods. These reasons are not the same for all cases of a given kind of cancer, nor for all kinds of cancer.

1. There are neoplasms whose radioresistance we do not know how to overcome. Radiotherapy causes the tumors to diminish more or less, but it allows some of the cancer cells that are less sensitive to survive, and these become the origin of later growths. Examples of this cause of failure are seen in certain cancers of the glands, epitheliomata of the alimentary canal, certain sarcomata, etc.

2. When the size, or the area of dissemination, of any cancer, even though it is relatively radiosensitive, is too great, the cure would demand the equal radiation of a very extensive part of the body. In addition to the fact that it is difficult to accomplish the necessary irradiation with perfect uniformity in the whole mass of tissues, the treatment in high dosage of too large an amount of normal tissue may cause severe and even fatal general injury.

3. When a cancer, even of good radiosensitiveness, is located in the neighborhood of normal tissues that are still more radiosensitive and the integrity of which is necessary for life, it may become impossible to apply the requisite dosage of rays over the whole cancerous region, since it might produce fatal lesions. This obstacle is one of those which up to the present time make impossible a curative radiotherapy of certain internal cancers (for example, cancers of the stomach).

4. The diffusion of a neoplasm to a great distance from its original place is always a factor of difficulty. When this diffusion, occurring by way of the blood vessels, tends to disseminate the cancer cells in the organism (multiple metastases through the blood stream), it is evident that the case is no longer suitable for radiotherapy, since this is a method exclusively local.

There exists, it is true, a type of radiotherapy, known as general curietherapy, which consists in introducing radio-active bodies into the blood for the purpose of spreading them through the whole body. This has often been tried in generalized cancers; but it has always been found that the dose necessary to destroy cancer cells is enormously greater than the dose that is fatal for the person.

Such are the limits of curative radiotherapy of cancers in general. It is evident that in a large number of cases, the reasons for failure enumerated above are variously combined with one another. When one or another of these causes or several together render cure impossible, radiologic methods are often able, nevertheless, to bring about an amelioration of symptoms, a temporary arrest of the processes, and a prolongation of life.

The circumstances which at the present time place a limit to the perspectives of cure and of amelioration of cancer patients by radiologic methods are far from being immutable. The progress made by these methods has been rapid and it appears to be far from having reached its end.

It is useful to take account of what the future holds in reserve. An important advance is to be expected from a more perfect understanding of the properties of cancerous tissues as well as from an accurate knowledge of the mechanism of action of radiations upon cells and tissues, both normal and neoplastic. Other advances will result from the increase of material means of radiotherapy and from improvement in methods of application. Finally, one must not consider as a fact *ne varietur* the degree of relative radiosensitiveness of neoplastic tissues in comparison with normal tissues. To increase radiosensitiveness artificially in cancerous tissues without increasing that of normal tissues is not an idle dream; it is seemingly one of the conquests of tomorrow.

To sum up again: the substitution of radiologic methods for surgical removal in the majority of epidermic cancers is a conquest of science which of itself justifies the building of special establishments dedicated to its practical application under the most perfect conditions obtainable; the extension of its progress to other types of cancers is a reasonable expectation, as the result of radiophysiological investigations and of improved technique, and the only barrier to the radiologic cure of cancers that is apparently impassible is their dissemination in the organism.

It is evident that the difficulty of curing a cancer, by radiologic methods as well as by surgical removal, increases with the extent of territory involved; the early application of treatment rendered possible by early diagnosis is, then, the type of progress most immediately to be desired and realized.

As for the progress of radiotherapeutic methods in general, experience shows that this is due much less to prolonged and extensive but routine practice than to laboratory investigations. These investigations, which are far from being easy, have their place nowhere better indicated than in the large centers of anti-cancer therapy, which are, moreover, made necessary by the growing complexity of methods. In these powerful institutions, the resources which the treatment has at its disposal may be a great source of help to the work of the research laboratories; and conversely, these labors of research are immediately profitable for practical progress.

The centers of treatment for cancer must, therefore, be close to the centers of experimental surgery, which have for their object the study of the biologic properties of cancer and the physiologic action of radiations.

III.—THE ORGANIZATION AND EQUIPMENT OF ESTABLISHMENTS FOR ANTI-CANCER THERAPY

A. The Number of Establishments

It is not necessary that centers for anti-cancer treatment should be very numerous, and by their very nature they cannot be so. In this regard we seem sometimes to have been tempted, in organizing the social campaign against cancer, to take as a guide the principles which lie at the bottom of the campaign against the great infectious diseases which are spread by contagion and which make continuous action necessary (both in the interest of the patients and for the purpose of preventing the spread of the germs). Hygiene, prophylaxis, and the supervision and treatment of the patients over a long period are, in fact, fundamental rules, from the point of view of anti-tuberculous and anti-syphilitic defense. These rules lead to the creation of numerous dispensaries readily available to patients. But it would be a complete error to organize a campaign against cancer after these models, since it is absolutely different in its pathology and etiology: cancers are never contagious nor epidemic.

On the other hand, radiologic treatments, as they are generally conceived today in cancer, do not require more than a small number of visits on the part of patients and are similar in this respect to surgical treatments. The treatment once made, the rôle of the technicians, surgeons, and radiologists is nearly always at an end. All that remains is to follow up the results from time to time, not to complete the treatment, nor to begin it over again in case of failure, but simply to learn and to register the fate of the patients treated.

One might raise the objection that it would be convenient for every patient to have as near as possible to his residence an establishment where he could be treated. This is doubtless true, but at the stage of the disease when surgery and radiologic methods are applicable, the patients can, for the most part, travel a long distance without difficulty or serious inconvenience. And there are stronger reasons that can be urged against the multiplication of centers for the treatment of cancer.

What is of extreme importance, after early diagnosis, is early and effective treatment.

Early diagnosis is a matter of propaganda, of instruction to physicians, of consultation services very numerous but with very simple equipment: these are not under discussion here.

The perfection of the treatment is a condition of absolutely prime importance. Since radiotherapy leaves in place the organ treated and leaves it unharmed (in appearance), many persons (and even physicians) wrongly suppose that the treatment by rays can be supplemented later or done over again several times in case of failure. This is a fatal error. Treatment of cancer by X-rays or by radium, if it carries a dose of rays sufficiently large to be curative, can almost never be given a second time in the same region: hence it is only rarely possible to repair a failure from the first treatment, and a twofold failure can never be repaired (except sometimes by massive destruction of the diseased part). It is essential to understand that the curative treatment of cancer, as well by radiation as by surgery, does not tolerate any weakness in its efforts, since these can generally not be applied a second time.[1] The first radiologic treatment, like the first surgical operation on a cancer, has a character of fatality: it is decisive for cure or for death.

Summing up: there is no important reason for placing special establishments for anti-cancer treatment in close proximity to patients; on the contrary, every other consideration should be subordinated to that of perfecting the care given. Now, the perfecting of this care demands a personnel of great experience, a costly equipment, and a considerable amount of installation: it is therefore evident that special establishments for the treatment of cancer cannot be greatly multiplied. The State which undertakes such an organization and becomes responsible for it will, consequently, be well advised if it creates its centers for cancer treatment not all at once, but one after another, with absolute subordination of their number to their quality.

Is it necessary to write the word "cancer" into the name which calls the attention of the public to the institutions dedicated to the treatment of cancer patients? This is not necessary, and it is certainly often a great handicap. One does not meet a great deal of stoicism among the patients. If we knew how to cure the majority of cancer cases, we should not have any reason for being particularly cautious about expressing our diagnosis, but we are very far from being able to offer this perspective to our patients. We ought, therefore, to avoid using a word and, with still greater reason, attaching a title, which may actually have the most disastrous effect upon their morale, by increasing their suspicion that they are victims of an incurable disease. "Institute for the Treatment of Tumors" is the title adopted by the University of Brussels, and it is excellent.

---

[1] This is the biological reason that stands opposed to the repetition of treatments, in curative dosage, in the same territory attacked by the cancer. Radiations cause in neoplastic tissues and in normal general tissues (connective, muscular, and vascular) two opposite effects: neoplastic tissues become progressively radio-immune, that is to say, they become more and more resistant to doses of rays administered to them (assuming that these are equal), while the normal general tissues which surround and interpenetrate the neoplasms are, on the contrary, made radiosensitive, that is to say, they become more and more exposed to necrosis. Necrosis is, then, the inevitable result of repeated irradiations.

To increase the number of cures and for the reason that I have just indicated, it is worth while in all establishments devoted to the treatment of cancer to intersperse patients who have other diseases among those who are suffering with cancer. Nothing is more simple, since radiologic methods have a curative rôle of great importance in a large number of affections which have the symptoms of tumor among their manifestations.

B. Organization of the Establishments

The services of an establishment specialized for the treatment of cancers must satisfy the three following needs: (1) the examination of patients and the work relating to diagnosis; (2) the treatments proper; (3) the preservation of documents of all kinds, the keeping of records up to date, and the publishing of results. I need not speak of teaching and research work.

1. *Examination of patients and work of diagnosis.* The organization of the consultations does not here demand extensive notice. It is naturally desirable to specialize them according to the sex of the patients, the localization of their disease, and the employment of special methods of investigation.

At the Curie Foundation (Paris) there are different days of consultation for new patients and for patients already treated. The examination of new patients is important for the classification of the cases and for the determination of the therapeutic indications. It is well for the surgeon, the radium therapist, and the roentgen therapist to take part in the study of the patients each time the decision as to the form of treatment comes up for discussion.

Repeated examination of the patients treated is of great value for the perfecting of radiological technique. The presence of the surgeon is not necessary except in cases where it is he who is charged with special procedures of investigation, but the presence of those who are to carry out radium therapy and X-ray therapy is indispensable, since the study of the immediate and the late results and the checking up of these results in connection with the details of the technique are for them a very fruitful source of information.

The patients treated must be seen over a long period following the treatment, until all possibility of recurrence is past. The examinations are naturally less frequent as the period of observation becomes longer. But for 10 years, if it is a case of cancer of the breast; for 5 years, if it is cancer of the uterus, and for 3 years if it is cancer of the skin, of the cutaneous orifices, of the mouth, etc., every patient even though apparently cured must be re-examined once a year. A patient who is alive and without subjective symptoms and who gives a good account of himself by letter is not always synonymous with a patient cured.

It is difficult to secure the return of patients, long after treatment, who consider themselves definitely out of danger. For this reason, a good secretarial service and a competent service of visiting nurses are of great value.

The collaboration of the physicians who send their patients to the establishments is indispensable. After the patients have received treatment they must be sent back to their physicians for supervision; letters must be written to these men for news of the patient; they must be kept interested in the results of the periodic examinations, so that they will become better instructed about the early diagnosis of cancers, and about the necessity of adequate treatment and the wise choice of the form this shall take.

I have already emphasized the necessity of special laboratories of histology, hæmatology, and bacteriology to complete the examination of the patients.

2. *Treatments.* There are certain skin cancers which can be treated by radium, and there are cancers in all parts of the body, provided the general condition is good, which can be treated by X-rays, without hospitalizing the patients in either case. But in the majority of cases hospitalization is useful, and frequently it is absolutely necessary. There is no establishment deserving to be called modern for the treatment of cancers by radiation which has not attached to it a hospital of a capacity adequate to its means of treatment. It is evidently desirable that the hospital, X-ray service and the material used for radium therapy, the laboratories and the consultation rooms be all grouped in the immediate vicinity of one another.

Every center of anti-cancer therapy should possess a perfectly organized operative department. Surgery is in fact necessary for certain methods of employing the rays: frequently the surgical procedure must precede or follow their application. Sometimes it is necessary to put radium in place by a veritable surgical operation (radium-surgery).

If the hospital is one of sufficient importance, it is interesting to make a certain number of divisions, each one corresponding to a group of cancers the treatment of which demands a different kind of expert and different materials: gynecologic cancers, rhinopharyngo-laryngologic cancers, skin cancers, etc.

All the services, even those that are not surgical, must work with absolute asepsis. One has no right to carry bacterial agents from one patient to others in connection with consultations and treatments.

3. *Cases that are no longer irradiable.* Among the patients of an establishment for anti-cancer therapy, there are some who, treated by surgery or radiations, have in the end had all possibility of amelioration by these methods destroyed. Some of these patients find a last resort in a cancer hospital (such as a "House

of Calvary" in France) or in some general hospital or other. Others are cared for at home until the end. Neither the one nor the other class should be abandoned or lost sight of. They should receive help in that home in which efforts have been made to cure them or to improve their condition. Toward this end visiting nurses and a dispensary capable of furnishing medicaments, dressings, and moral comfort are the last resource.

4. *Secretarial service, preservation of histories, and filing of records.* A first-class secretarial service and a bureau of archives are indispensable in a center for the treatment of cancer. The necessity of preserving clinical records and numerous and various laboratory reports and of keeping on file a *very* prolonged observation of patients treated, which can be open to inspection at a moment's notice; the progress of radiotherapeutic technique and its provisional character, resulting in incessant changes in the details of the treatments; the need of keeping open to ready inspection results of numerous kinds, with a view to the publication of statistics—all these clearly call for an organization of records as complete and as perfect as possible.

One of the duties of establishments especially organized for the treatment of cancer is to publish accurate statistics; these have not only great scientific interest but also a considerable practical importance, since they are appealed to as authority.

C. *Radiologic Equipment*

X-rays. I shall not stop here to speak of the roentgenologic material equipment nor of the protection of patients and personnel against accidents and against the injurious effect of the rays: these are technical matters not related to my subject.

One point in the organization of the roentgenologic department that deserves to be given very serious consideration is the part which the physician and those who are simply manipulators should play in the treatment.

It is well known that the treatment of a deep epithelial cancer by X-rays requires a certain number (sometimes a large number) of sittings. To get our ideas fixed in this regard, I may say that the technique which has given the best results at the Radium Institute of Paris in cancers of the uterus which have involved the connective tissue and the lymph nodes of the pelvis calls for many hours of X-raying, distributed over twelve to fifteen days at the rate of two sittings a day.

It is evident that treatment of this kind demands of the physician who wishes to carry it out personally great assiduity and devotion. It is, therefore, natural, at a first glance, that after making the plan and formulating the details, the physician should entrust the execution of the radiation to an assistant and should content himself with an occasional supervision.

Now, I believe that an important cause of failure lies in a certain confusion about the parts played by these two persons, the roentgenologic physician and his assistant. The physician should prepare for, and then himself initiate, every session of irradiation. The assistant should continue this and go on with it in such a way that there is no change whatever from the initial conditions. At the end of every session the physician should again make sure that nothing has been changed. It is the physician alone who can place exactly in the field of the rays the deep region to be treated. It is he alone who can establish with the rigorous precision that is necessary the distance, the directions of irradiation, etc.; for the perfection of these details of treatment demands an understanding—I might say an exact mental picture—of the topographic anatomy of the lesions of which the assistant has generally only an imperfect idea.

The manipulator—whose rôle is likewise indispensable—should, after having assisted the physician in placing the patient in position, see that the latter remains motionless, should control the functioning of the apparatus, maintain the prescribed dosage, and note faithfully upon a register the indications furnished by the measuring instruments. Many misconceptions have followed in all countries the announcement of the first success of roentgen therapy in deep cancers. Must not the principal cause of this be sought in an erroneous belief in the facility of this method, a belief associated with an inadequate organization which limits to a small number of hours per day the presence of the radiologist (as of the other physicians) in the hospitals? In establishments that are specialized for the treatment of cancer it is relatively easy to have a "full-time" personnel and consequently to avoid the disadvantages that result when the radiologists are present too little of the time.

Radium. Methods of treatment by means of radio-active foci have developed in a remarkable manner.

For several years now, thanks to the more considerable quantities of radium which the physicians have had at their disposal, foci of greater power have been constituted which are made to act at a distance from the surface of the body for the purpose of treating either thick skin tumors or deep-seated cancers. In the latter case excessive irradiation of the skin is avoided by using the artifice of "cross-firing." "Distant radium therapy" is today effected according to two principal methods: in the first, the radium is disposed over the exterior surface by supports which have sometimes a rigid and immovable form but are sometimes made of a plastic material molded over the region to be treated, and all resting upon this latter; in the second method the radio-active focus is independent of the patient's body just as an X-ray tube is.

All these modes of employing radium call for as many different forms of technique, necessitating special apparatus which I cannot take time to describe here.

The preparation of these forms of plastic apparatus is done in a small workshop very simply equipped.

The protection of the personnel who prepare and apply the radio-active foci is of great importance. It is accomplished by the use of special tables plated with lead upon which they should endeavor to make all their manipulations, and by very simple instruments serving to control and regulate the foci. But the mere prescribing of known protections would be vain if the personnel did not make an effort on its own part to acquire the habit of an absolutely strict discipline. Powerful foci at a distance render indispensable a more complete protection of the patient and the operator. This is accomplished by walls of lead 5 to 10 centimeters thick, canalizing the radiation; but this results in a considerable increase in the weight of the focus and demands special arrangements for holding the apparatus, and for directing the beam of rays rightly and safely in the body.

The use of a distant radium focus requires, as does the administration of X-rays, the personal presence of the radiologic physician at every sitting in order to assure the precision of the irradiation, without which no satisfactory results could be obtained.

The radiologic equipment of an establishment especially designed for the treatment of cancer may become modified more or less considerably in the future, according as radiophysiologic investigations and therapeutic experiments attribute a greater or a lesser practical importance to the theoretical superiority of γ-rays over X-rays.

The superiority of γ-radiation is due to its greater selectivity: that is to say, to the more perfect accuracy with which it acts upon the radiosensitive cells (for example, the cells of an epithelial cancer), while injuring to a minimal degree the elements of the normal general tissues. If to the argument of its greater selectivity there should in a near future be added a material diminution in the price of radium, it might be that X-ray therapy of cancer would become less usual, through the greater advantages of radium therapy. It is premature to judge of this at the present time.

The radio-active substances that are employed are almost exclusively radium, mesothorium, and radon (radium emanation). Radium and mesothorium (the latter much less in vogue) are confined in a solid state in dense metal tubes immune to chemical attacks (platinum, gold); the content of these tubes in radio-active substance is definite and invariable at the time of their construction (barring the quite rapidly decreasing radio-activity of mesothorium); the wall of the tube serves to filter the rays. Radium emanation is extracted periodically (every day or every two or three days, etc.) from a solution of radium. It is enclosed in glass or metal tubes which are introduced directly into the tissues, or in tubes whose metal filter-sheaths are charged, like those which contain radium. The radio-activity of radium emanation tubes decreases by one-half in a little less than four days.

Should an establishment especially designed for treating cancers prefer radium in tubes, radium emanation, or should it employ both methods at the same time?

One of the reasons that may determine the choice has to do with the cost. While radium represents capital which must not be allowed to deteriorate or to be lost or stolen, the emanation, on the contrary, represents the available interest produced by this capital. When radium emanation is used, the radium capital remains safe in the laboratory, but this argument has no importance, for radium is easily insured against all risks.

On the other hand, by the application of tubes of radium which can be transported almost indefinitely from one patient to another without loss of time, the radio-activity is utilized without anything being lost—and this cannot be done with radium emanation.

Finally, the preparation of radium emanation demands a special form of equipment, many measurements, a physician who is a technician and many assistants taking turns in its preparation (as a measure of personal protection); and the manipulation of this substance, furthermore, is a risk to the health of the personnel. To sum up, from an economic point of view the advantage is on the side of radium distributed in tubes.

Are the biological and therapeutic effects of tubes of radium and radium emanation different? Not appreciably. Radium emanation is, however, indispensable for the utilization of bare tubes without filtration of β- and γ- radiations. It is a little more convenient than radium for radium-puncture by needles. And lastly, it is very valuable for all experimental work because of the unlimited variation which it is possible to give to the dosing of the foci.

In other respects, as regards a choice between these two, there remains little beyond reasons of convenience and custom. The duration of the applications, their continuity or discontinuity, the notation adopted for the dosage —these are matters beyond the scope of this paper.

RÉSUMÉ

I. The treatment of cancer tends to become centralized in special establishments. The causes of this evolution are:

1. On the one hand, the necessity of associating more and more closely physicians (surgeons specialized in radium therapy and in X-ray therapy) and scientists (physicists, histologists, hæmatologists, and bacteriologists), and of substituting for the work of the individual the collective work of a staff.

2. On the other hand, the increasing part played by radiologic methods in the treatment of cancer, the specialization of apparatus designed for deep X-ray therapy, and the enormous cost of the necessary quantities of radium.

In such establishments the choice of methods is easily made in a spirit of absolute impartiality.

The loaning of radium, or the sale of radium emanation on order by associations of doctors or commercial companies tends to maintain individual initiative in cancer treatment, but has the disadvantage of making radium therapy, which is a difficult method, available to doctors of medicine who are not altogether competent to practice it.

II. The creation of special establishments, rendered necessary by the development of radiotherapeutic methods, is justified by the results that they are already capable of accomplishing.

In the various localizations of epidermic cancers (in the skin, cutaneous orifices, mouth, cervix, etc.), the use of X-rays and, even more, of radium, gives results equal to those of surgery and, in their ensemble, probably superior.

In other forms of cancer, the advance made by radiologic methods is much less; employed alone, they do not ordinarily furnish more than palliative results, although these too are important; it is often necessary to associate them with surgical removal. Their failures are due: (1) to radioresistance of the neoplasms; (2) to the too great (local) extension of these—two limits of efficacy which (it may be hoped) will be exceeded by new advances in the fields of biology and technique, and (3) to the generalization of the disease (primarily local)—an obstacle that proves insurmountable for radiotherapy.

The progress to be expected in radiologic methods should make us regard as very useful the organization of a department of radiophysiologic research in all the great establishments of radiotherapy.

III. It is not necessary for special establishments devoted to the treatment of cancer to be near the residence of patients. On the other hand, the complexity of their organization and the cost of their equipment do not permit the erection of many of them. These two reasons combine to restrict their number.

In the treatment of cancer every other consideration must be absolutely subordinated to the perfection of treatment, since radiotherapy, like surgical treatment, cannot be repeated.

As regards the morale of the patients, it is desirable that the word "cancer" should not be written into the title of a therapeutic establishment and that patients suffering with various forms of benign tumors that can be cured by radiations should be admitted along with cancer patients.

The organization of establishments designed to treat cancer includes: examination of the patient and the work necessary for diagnosis, the treatment proper (surgery, radium, X-rays, and a department for non-irradiable patients), and the careful preservation of records of all kinds (a secretarial staff). Every important establishment devoted to radiotherapy of cancer must be able to provide hospital care for the patients and must not confine itself simply to the treatment of ambulant patients.

An excellent surgical service is equally indispensable.

The protection of the personnel from lesions caused by X-rays and radium must be made the object of scrupulous discipline.

The careful and effective administration of X-rays and radium absolutely demands the actual participation of the physician at every sitting (X-rays, radium at a distance) and at every dressing followed by re-application (radium). At each sitting, particularly of deep X-ray therapy, the placing of the patient in the field of raying is a duty belonging exclusively to the physician and must not be carried out by an assistant to whom he simply gives directions.

The question of the superiority of radium over X-rays, or vice versa, is of great importance for the equipment of an establishment. It has not been settled from a practical point of view.

Radium may be employed either in the state of a solid salt (in tubes and in needles of dense metal), or in solution for the preparation of radium emanation. A well-equipped establishment should have both methods at its disposal, because each has advantages and disadvantages. However, radium in the form of a solid salt seems at the present time to lend itself to more general use than radium emanation.

DISCUSSION

DR. WILLY MEYER, New York City: I want to emphasize, having observed in a large group of cases what can be done with the help of operative surgery, that so far as the treatment of operable cancer is concerned it should be left to the surgeon. I know that in this belief many of my colleagues, who have seen what can be accomplished by conscientious radical extirpation with the knife, are in accord. Of course we have to go ahead on strict indications; we have to be conscientious, and the extirpation must be done by a surgeon who knows how to operate. For that reason, I feel that it is correct and proper to speak of "cancer surgery" as a special form of surgery, embracing, so far as the head is concerned, the skull, the sinuses, the mouth with the tongue, hard and soft palates, etc.; it will imply also a perfect knowledge of plastic surgery. The slides that we have seen thrown on the screen and the patients we have seen at our meetings—often years after operation—show that surgery is the best treatment and the most reliable treatment of cancerous affections, the treatment of choice if it is done conscientiously and properly.

Naturally, there are a number of patients who dislike surgery and prefer another method, if it is at their disposal. Personally, I feel that radiation, whether it be by the X-rays or radium, should step in only when it is the actual choice of the patient who is willing to take his chances. The knife, used conscientiously and properly, removes the source of the trouble radically at one sitting. Of course, in any discussion as to the value of the respective modes of tumor removal it is understood that the surgical removal must be really radical; that the whole tumor mass must, if possible, be removed, together with the lymphatics and respective lymph nodes in one piece. The results in many cases that have thus been operated upon and followed up for years show that this is correct. To repeat: the patient who submits to X-ray or radium treatment takes a chance, for not every case will respond to the X-rays.

We had an interesting discussion on this very subject before the American Association for Cancer Research in Boston, three years ago, and one of the speakers remarked that the surgeon and the radiologist should make it a point to see these cases together and in a mutual discussion should determine what is best to be done. He expressed the opinion that such co-operation should be carried out in our hospitals, and that both doctors should tell the patient the absolute truth as to what is to be expected from either treatment. I coincide with that view.

A good follow-up system will further show what should best be done in the future. It will show this in later years by comparison of the cases that have been treated by means of radical operative cancer surgery and by X-rays and radium.

After all, I believe that the surgeon who uses the knife conscientiously, carefully, and correctly will have the best results and therewith do the best for his patient.

Dr. James Ewing, New York City: Many years ago, I think about 1880, the writer of the article on Hospitals in the *Encyclopædia Britannica* constructed an argument in favor of the erection of special hospitals for cancer patients. His views, formulated in a very early period of organized cancer control, seem to have been well founded, for there has been a general movement toward the establishment of special cancer institutes in many countries, and especially in recent years. Certainly no one who has seen the great institution which Dr. Regaud has created in Paris for the modern treatment of cancer, especially by radiation, can doubt the necessity of such institutions for this purpose. Unfortunately not many communities can hope to combine such knowledge and skill with such equipment, but we may at least hold to such an ideal as something to work for.

As a pathologist interested in the study of cancer I find many advantages in a large cancer institute, which are not to be found in most large general hospitals. The extent of the material observed in a cancer hospital offers an opportunity to witness the natural history of many tumors under different conditions, and only such information can render one fully competent in the diagnosis, prognosis, and treatment of these diseases. In most large general hospitals there is a good deal of cancer material, but seldom enough to furnish that broad experience which is desirable. Moreover, accurate knowledge of many important forms of tumors is not widely disseminated. Not many years ago, in discussing neurogenic sarcoma, I was surprised to find very few physicians in my circle who were familiar with the peculiarities of this common tumor, or knew that it was a phase of Recklinghausen's disease. The Codman registry of bone sarcoma has revealed most impressively the limitations of knowledge of these diseases and also the fact that what is known about them is not widely known, so that the treatment of these diseases is rather haphazard. I mention these two examples from a long list of similar conditions. I do not see how these deficiencies can be met and adequate knowledge of tumors obtained except in a large cancer institute.

Prof. Henri Hartmann, Paris (Dr. Lenz, interpreter): In spite of the fact that I am a surgeon, I cannot agree with the statement made that surgery is always more radical than treatment with the X-rays or radium.

Take cancer of the tongue, for example. We have two forms of cancer of the tongue: (1) the papillomatous type, in which the knife is effective and with it one may perform a radical operation; (2) interstitial cancer of the tongue, in which the knife is never sure to do a complete operation and to remove all traces of the disease. In such cases we use needles of radium and it seems that radium gives more adequate results than operation by the knife.

You may think the knife is radical, but it is not. The glands of the neck must be removed with the knife, but in the tongue radium gives better results than removal by the knife. My final results are certainly as good in cancer of the uterine cervix treated with radium as in cases treated by the Wertheim operation, and with radium there is no operative mortality. In such cases I prefer the radium.

Dr. Archibald Leitch, London: It has been suggested that I might say a few words, first, in regard to special cancer institutes, and second, in regard to a comparison between X-ray and radium treatment on the one hand and surgery on the other.

At a general hospital the cancer patients are distributed throughout the wards, and the surgeon and pathologists do not have an opportunity for the observation and study of cancer that is afforded in a special cancer hospital. In our Cancer Hospital in London there are not only operable cases under various surgeons but inoperable cases under the care of physicians and a department devoted to radiology. These are all practically under one roof and there are all the facilities for treating cancer.

The hospital has been endowed for the treatment and study of cancer, tumors, and allied diseases, and our surgeons are general surgeons. We have found from experience that it has served very well. We have found that in this way a much more extensive knowledge of cancer and the surgical pathology of cancer can be obtained than would be possible otherwise.

As to the relation between surgical treatment and radium treatment I do not think that hitherto we have been comparing anything like equals. In most instances where radium has been effective the tumor is in its earliest and least malignant stage—an ideal condition which is seldom met.

We have to treat cancer as we find it, and as a pathologist I cannot believe that radium will affect the malignant cells that are penetrating the surrounding lymphatics—a condition we must always assume.

Cancer travels by the lymphatics and any operation or any other treatment, no matter what it is, that is to be effective must not only remove the focus but the way by which cancer is being spread.

To my mind surgery whenever possible must take precedence over radiation. Even my colleague, the director of the radiotherapeutic department, maintains that surgery is the treatment of choice and the one he himself would submit to if he developed cancer.

It is our task in the pathological department to work out for the surgeons the pathways by which cancer tends to spread and thus enable them to remove entirely and in one mass not only the original focus but also the dangerous areas by which cancer spreads.

Dr. Burton J. Lee, New York City: I want to thank Dr. Greenough for his very excellent paper in which he has presented radiation results in a fair-minded manner. Referring to Dr. Leitch's remarks, it seems to me that in a cancer institute, if the final decision is to be made by the surgeon, surgery will be inevitably the method of choice in most cases. In our experience at the Memorial Hospital, the decision as to the method of treatment to be employed is made jointly by surgeons, radiologists, and pathologists. Such a joint judgment must, of necessity, be a less biased one than when the surgeon alone dictates the therapy to be employed.

I am, primarily, a surgeon, secondarily, a radiologist, and I confess that I am often distressed at seeing patients suffering with wholly inoperable cancer of the breast, in which the attempt has been made to eradicate the disease by radical surgery. It is in this particular group of patients that the most careful judgment concerning therapy should be used. With all the data at hand concerning the patient suffering with cancerous disease, one should always ask himself the question: What is best for this patient—not, What do I want to do with this patient?

Cancer of the cervix furnishes the best end-results that have been obtained by radiologic methods. The results justify this form of treatment, as shown by the hospital records of the last ten years.

Prof. Léon Bérard, Paris (Dr. Gendreau, interpreter): In the present state of knowledge one cannot make a definite choice between surgery and physical agents (X-rays and radium) for the treatment of cancers. Nothing is absolute in clinical medicine.

On the other hand, a meeting like this one can render a great service to physicians and general surgeons in specifying which cancers ought to be operated upon by surgery and which should be reserved for treatment by physical agents.

It is not to be doubted that with the apparatus we have today *endodermic* cancers, that is to say those of the stomach, intestines, corpus uteri, ovaries, and kidneys, do not respond to the action of radium and X-rays. They must be eradicated by the surgeon as soon as possible and without pre-operative irradiation.

On the contrary, *exodermic* cancers, epitheliomata of the skin, mouth, pharynx, larynx, vagina, cervix uteri, etc., can be treated as successfully by the physical agents as by the knife, but with less destructive effect and less operative mortality, and with better functional results and more acceptable scars.

When lymph nodes are definitely perceptible and when their malignancy has been clearly shown by microscopic examination, they ought to be removed with the tumor by a block dissection accompanied by a pre-operative and postoperative irradiation of the whole suspected territory. Often in these cases the physical agents, radium and the X-rays alone, have little or no action on these cancerous adenopathies. It is better to combine such irradiations with surgery—but if the combination is impossible, surgery alone is still much to be preferred to radium or X-rays alone.

As for cancer of the breast, notwithstanding the success attributed to physical agents, I think it ought to be left to the surgeon, who should, after the methods of Halsted and Handley, make a wide ablation of the tumor and lymph nodes when the extension has not reached the supraclavicular stage.

Dr. Andre Crotti, Columbus, Ohio: Five years ago we started a cancer clinic in Columbus, Ohio, for the purpose of offering to the public facilities for the diagnosis and treatment of malignant growths. This cancer clinic has been very successful and has been a great factor as an educational means, not only in the city but in the surrounding districts. Beside my connection with the clinic, I am Chief of the Surgical Department of White Cross Hospital. In these two institutions the method of handling cancer cases has been very much as follows:

1. All superficial cancers are sent to the radiologist.
2. Carcinoma of the cervix is regarded as a superficial cancer and consequently treated with radium. In the last six years I have not performed a single hysterectomy for carcinoma of the cervix. All these cases are treated with radium. I must say the results have been as good, if not better, than when they were treated surgically, i.e., by hysterectomy.
3. Carcinoma of the fundus is essentially a surgical case and is consequently treated surgically, i.e., by hysterectomy.
4. Carcinoma of the breast is essentially surgical. Radiology is used as an adjunct after operation, but primarily cancer of the breast, if operable, belongs to the surgeon.
5. All cases of deep-seated cancer are surgical, if still operable.
6. Carcinoma of the gum is treated by radiation.
7. In cancer of the tongue our results have been bad, no matter what method was chosen, radiation or surgery.

I am glad our methods are practically the same as those advocated by our distinguished visitors.

Dr. E. S. Kilgore, San Francisco, Calif.: We have listened all afternoon to what is the most important problem before us, the arrival at unanimous opinion as to the kind of treatment the respective varieties of cancer should have. The two papers under discussion have pointed the way to a solution of that problem—the study of patients by surgeons and radiologists together in cancer hospitals or on cancer committees in general hospitals.

I should like to point out one advantage, not particularly mentioned here, of the co-operative method of diagnosing and treating cancer—the advantage to the profession in the region around the center.

At the San Francisco Hospital the cancer committee has had the experience of receiving requests from outside physicians for our combined advice on individual cases. These physicians feel that if we fight it out first among ourselves and come to a conclusion, they will receive advice on which they can act, instead of receiving advice of one kind from a surgeon and other advice from a radiologist if the patient is seen separately by these men.

Prof. William de Vries, The Hague: I want to say a few words in reference to our cancer institution in Holland.

Our cancer institute has been founded by private contributions. Subsidies are given by our Government, by the City of Amsterdam, and by other cities. It is not called a cancer institute but the "Antoni van Leewenhoekhuis," and I think it is an advantage that it does not operate under the name of a cancer institute. A man who has no cancer in his family does not bother about the name, but a person who has cancer in his family knows very well that the Antoni van Leewenhoekhuis is a cancer institution and treats cancer.

In the second place it is preferable that a cancer clinic with its laboratory should be a separate institution and not attached to a university or a hospital, because when it is a separate institution, with separate building and separate laboratory and research men, these men become specialists in cancer and they know more about it than the general pathologist and the general surgeon who are doing other things as well as treating cancer.

In regard to the treatment by knife and radiation, I am in about the same position as the others who have spoken regarding cancer of the lip, skin, uterus, etc. In our institute we have had 16 cases of cancer of the œsophagus treated with radium, most of them with no good results whatever. In one case, however, controlled by microscopic examination, the patient was still well after two and one-half years. In one case there was nothing to be seen after one year. So it seems that there may be cases of cancer of the œsophagus that may be cured, at least for a long time, by radium treatment.[1]

Dr. William H. Welch, Baltimore, Maryland: In the United States it has been considered a great detriment to medical education that so many special hospitals exist apart from any association with general hospitals and universities. This has been one of the great problems in medical education. There is need to establish with university medical schools clinics in these special fields. I am against special skin hospitals, etc., outside of general hospitals. Special hospitals should be university eye clinics, university skin clinics, etc. I think it is extremely important to have the clinics and the universities correlated. I feel that pathologists are somewhat skeptical of the material that comes from special hospitals.

It is also important to have our physical laboratories correlated with university medical schools. I am in sympathy with Dr. Ewing, who called attention to the fact that pathologists have studied specimens without knowing the fate of the patient from whom the specimen was taken. I wish to stress the importance of not detaching our cancer institutions from general hospitals and university medical schools.

---

[1] Radiumbehandeling van Slokdarmkauber. W. T. Wassink. Nederl. Tijdschr. v. Geneesk., 1926, I, No. 3.

THE WORK OF DIAGNOSING AND TREATING CANCER IN NORTH GERMANY

By Dr. ROBERT BIERICH, Hamburg, Germany
Director, Institute of Cancer Research, Hamburg; Lecturer on Cancer Research at Hamburg University

As a preliminary to the following report on the work done in Germany in diagnosing and treating cancer, it seems necessary to point out that the reliability of the results given by any method used in this work will increase the more the method employed takes into account the specific factors of the malignant growth.

FUNDAMENTAL FACTORS OF GROWTH

According to the rule of the transformability of matter, the qualities of a given system will become altered in proportion as changes occur in the surrounding medium. This rule holds good not only for inanimate systems but also for the living cell. A clear proof of its validity with reference to the latter may be obtained by any method of experimental production of malignant growth which is obtained by introducing efficient factors into the medium of normal cells. After reaction with these substances, the system in the normal cell and, consequently, the vital process of this cell, becomes altered in a distinct but still unknown manner, as is shown by a transformation of the formerly benign qualities of the cell into malignant qualities. According to generally accepted ideas, this process in living cells consists of interactions of different physicochemical compounds, connected with each other by the general laws that govern all processes in animate as well as in inanimate nature. The natural sequence by which one reaction is followed by another is dependent upon the integrity of all the compounds of the system. This system—and my opinion is based, I may say, upon studies of the past year—seems to be regulated by some general factors of which at the present day only two are known to me. By comparing the qualitative and quantitative conditions of these factors in normal and in malignant cells, we have obtained good evidence that one of these factors, which is apparently not qualitatively altered in the cancer cell, is there altered quantitatively. At the present moment this difference is not regarded by us as wholly conclusive, because we have found that some normal organs (though their number is very small) show the same quantitative type as cancer tissue. We hope to elucidate this discrepancy in due time.

I am mentioning this research work here in order to point out once more that factors belonging to the minute physicochemical composition of the cell determine the qualities as well as the formal appearance of the process in question, and that a reliable basis for diagnostic methods may be expected to be derived from them.

PRESENT-DAY METHODS OF DIAGNOSIS

All present-day methods of diagnosing cancer use direct or indirect determinations of secondary qualities of the malignant growth. The physical qualities of the tumor taken into account for the diagnosis are its size, consistency, location and relation to the surrounding tissues, and its contours as seen on the X-ray screen.

The chemical qualities determined are, for instance, the absence of free hydrochloric acid and the presence of lactic acid in tumors of the stomach, the increase of eosinophiles in the blood in cases of metastases in the bones, the presence of jaundice in cases of metastases in the liver, or the appearance of lactic acid in the urine after the administration of a large dose of sugar—as found by Glaessner, 0.3 per cent (5).

These methods are employed to ascertain, first, whether or not there is a tumor, and second, whether the tumor is of a malignant nature. For the purpose of deciding this question with greater certainty, there have been in use various serological methods, as for instance those of Boyksen, Freund-Kaminer, Abderhalden, Kahn, and the miostagmin reaction.

As a result of addressing inquiries to our leading clinical authorities on internal medicine, surgery, and gynecology, as to which of these methods are still in use and have proved satisfactory, I have learned that they all regard all of them as unreliable for diagnosing incipient malignant growths or suspected tumors.

It is particularly worthy of note that Professor Mueller of Rostock, from whose clinic the Boyksen test came forth, now rejects this method as unreliable, because of its non-specificity. For the same reason all the clinics from which I received answers reject the value of serological methods for diagnosing cancer. It is a very common occurrence in the world that not all those things which have been announced with great acclaim have fulfilled the expectations they aroused.

RECENT GERMAN INVESTIGATIONS

Some months ago, a paper was published by Miss Schumacher (11) of Professor Embden's laboratory in Frankfort, which promises to be of much assistance in the diagnosis of cases of cancer of the stomach or bowel complicated by metastases in the liver, the method being a direct outcome of the more recent results of the biochemical study of the carbohydrate metabolism of cancer tissues.

In Germany, investigations of the metabolism of the cancer cell carried out since 1923 have led to two different conceptions as to the mechanism determining the abnormal increase of lactic acid in cancer tissues.

The idea which is being advanced by Warburg (13) of Berlin is that cancer cells, being in need of energy for their growth—or, as we may say, for reproduction

—and not having sufficient oxygen at their disposal for this process, make up the deficiency by splitting sugar. Warburg has tried to explain the essential difference between normal and malignant cells as being conditioned by a deficiency of oxygen supply to the malignant cells, this insufficiency being over-compensated by a seventyfold increase of their power to split carbohydrates into lactic acid, *i.e.*, of their glycolytic capacity. For the purpose of demonstrating this hypothesis, Warburg investigated what would happen with cancer tissues surviving in the absence of oxygen in a Ringer solution at 37°C. The normal Ringer being insufficient, he was obliged to increase its sodium bicarbonate content tenfold and its sugar content to 2.5 per thousand. Under these conditions the sugar was found to be split into lactic acid, which passed into the solution and could be determined therein. When the influence of normal tissues upon the glycolytic process was studied by this method, very little lactic acid was found in these tissues, while with malignant tumor tissues there appeared a great deal of lactic acid into which the additional sugar had been transformed. This result Warburg explains as being due to the high reaction velocity of the glycolytic process in tumor cells, which process, according to him, is lacking in normal cells (14).

In the same year in which Warburg issued his first publication (12) concerning this matter, we began issuing another series (2) which led to the idea (3) that the splitting of sugar into lactic acid is a process employed throughout by all chemically active cells, in which the lactic acid starts the specific work done by these cells. In other words, this reaction could not be found to be a prerogative of cancer cells but a normal and general function of all active cells. After it has carried out this specific work, the main part of the lactic acid produced in normal cells is immediately reconverted into carbohydrates. In consequence of this rapid reconversion, normal tissues always show a low content of lactic acid. Now, if this reconversion were to be in any degree hindered by some cause or other, as it is hindered, according to our conception, in cancer cells, this would lead to a corresponding accumulation of unconverted lactic acid. Determining the lactic acid content of normal tissues immediately after excision, and at regular intervals later on, we found the content of these tissues to be the higher, the greater the time that had elapsed between excision and fixation. A similar accumulation of lactic acid may be observed also during life in a contracting muscle, this accumulation becoming the higher, the longer the oxygen supply to the tissue is suspended. In both cases the suspension of the oxygen respiration of the tissue being followed by a corresponding accumulation of lactic acid, we concluded that this sequence was to be regarded as a general reaction of active cells lacking oxygen. Concerning the mechanism of this reaction, there was no doubt that the oxygen respiration of a tissue could be hindered to a variable extent and in different ways. Being especially interested in conditions which might lead to the high increase of lactic acid in cancer tissues we became convinced that a local suspension of the cell respiration would be the most efficient factor, by reason of its suspending the reconversion of the lactic acid produced by the cells. We have obtained good evidence that factors belonging to this category are at work in producing the malignant growth. In accordance with this idea, it may be expected that tumor tissues will generally contain more lactic acid than the tissues of actively working organs. To both statements there are—as I have found—exceptions which, although they would at first sight seem to contradict this rule, tend rather to confirm it.

The lactic acid content of a tissue varies with the relative number of its active cells. For instance, tumors poor in cancer cells have a very small lactic acid content, which is found to be lower than the content of a tumor rich in cancer cells.

On the other hand, actively working normal organs consisting almost entirely of active cells would show a relatively high lactic acid content, which might be as great or even greater than the content of a malignant tumor poor in active cells. But, as explained above, the different content of lactic acid in normal and in cancer tissues is dependent not only on the amount produced by these tissues but also on the extent to which this amount is reconverted into sugar. An actively working normal tissue containing a great number of active cells that are able, by means of sufficient oxygen, to reconvert the lactic acid produced by them, may, therefore, show nearly the same content of lactic acid as a cancer tissue containing a small number of active cells that are unable so thoroughly to reconvert the lactic acid while supplied with insufficient oxygen.

Cori (4) of Buffalo and, later, Warburg of Berlin (14) have demonstrated in a very instructive manner the fact that the tumor veins in a living animal contain less sugar and more lactic acid than the artery of the same tumor. This may, I believe, be regarded as a proof of both theories.

It was to be expected that any increased amount of lactic acid produced in any organ would be carried off by the blood vessels, thereby leading to an increased content of this acid in the blood. This expectation could not be realized under normal conditions, as, for instance, after hard muscular exercise. According to work done by Barr, Himwich, and Green (1) and by Meyerhof (10), this fact is explained by the supposition that the non-appearance of an increased content of lactic acid in the blood is due to its reconversion into sugar in the liver, the resting muscles being, besides the liver, the only other organ for reconversion. In cases where the liver might be unable to fulfill the reconversion, perhaps being itself involved to a greater extent by metastases of malignant tumor, the lactic acid that has accumulated in the tumor and has been transferred from it to the liver would remain unreconverted and would therefore accumulate in the blood. According to the results obtained by Miss Schumacher, this supposition has been proved correct. Miss Schumacher found that the blood content of lactic acid in every case of cancer, except in cases in which the liver is involved in the malignant growth, is not higher than that of normal persons, while in cases of cancer metastases in the liver, the lactic acid content of the blood was always found to be increased beyond all possibility of error.

Another important process has been cleared up with regard to the clinical test for lactic acid in cancer of the stomach. Mendel (9) ascertained that the well-known lactic acid bacilli found in cases of cancer of the pyloric portion of the stomach are not the producers of lactic acid, but that the lactic acid found in such cases is due to the above-mentioned metabolism of the tumor.

Summarizing all the diagnostic methods employed up to date, we see that only those derived from the specific physicochemical process can be depended on to give a reliable diagnosis of cancer. The others cannot pretend to this, and if they should answer reliably they would do so only in the hands of a person with extensive practical experience. We are inclined to hope that the remaining, and greater, part of the metabolism of the cancer cell, which has not yet been examined by us with such care as the carbohydrate metabolism, will furnish results from which a practical method for the diagnosis of cancer can be derived.

THE TREATMENT OF TUMORS

There are great difficulties in the way of laying down the general lines of treatment of tumors. Even two tumors of the same organ—for instance, two cancers of the breast—differ in some important qualities from each other. An essential difficulty arises in defining whether the process is localized or generalized, whether the reproductive power of its cells is high or low, and whether the factors leading to cachexia are more or less pronounced. For on the determining of these qualities depends not only the extent of operative limits, but also the method of postoperative treatment.

It must be conceded that at least the question of generalization may be answered in some proportion of the cases by the before-mentioned methods, but every surgeon is familiar with the experience of having the rest of his material confront him with totally unforeseen and undiagnosticable complications. Practical medicine of the present day has no solution for these problems, while pathological anatomy may base its determinations on morphological qualities of the cancer cell, as, for instance, its glycogen content, or the precentage of mitotic figures of cells. In cases where the character of a tumor cannot be diagnosed with proper certainty by the usual methods, a biopsy may be carried out, followed as soon as possible, after histological diagnosis, by the operative removal of the tumor. The value of such a diagnostic operation being clear, more theoretical objections have been propounded, which were mainly derived from the apprehension that every biopsy would give a good chance of mobilizing tumor cells, or of implanting them in the wound. Professor Anschütz of Kiel has shown by comparing the operative results in patients with and without biopsy that such apprehensions may be regarded as unfounded.

RADIATION

The center of the stage in all questions concerning the treatment of cancer is occupied by the still unsolved problem of the action of the X-rays on normal and on malignant cells. Until this problem has been cleared up from the theoretical point of view, I believe that the practical work of treating cancer by X-rays cannot be substantially improved. Even if we may concede that there are inoperable cases of cancer which have undoubtedly remained cured for a long period of years, we are, on the other hand, acquainted with cases which react to X-raying less readily or in some parts not at all.

Such observations are explained by the assumption that the insufficient reaction of cells is due, not so much to an insufficient concentration of the X-rays on that part of the tumor which did not react in the way it was expected to do, as it is to some insufficient reactivity inherent in the cell itself. In fact, physical sensibilization of the irradiated part of an organism has not been obtainable to a sufficient degree, while the other way of sensibilizing the tumor tissue, the chemical, seems to be the method of the future. It must be conceded that no work done at the present time in this direction has led to valuable results. I may mention here the work of Hofbauer (5) who attempted to sensitize gynecological cancers by X-ray irradiations of the hypophysis; the work of Mayer (7) who, having injected sugar intravenously, believes that he has attained a much higher effect of irradiation than with normal unsensibilized tissues. The same effect, a chemical sensibilization of the cells in question, may be attained by means of a great many pharmaceuetical preparations, as, for instance, colloidal lead, introcid and others. The methods of X-ray treatment are up to the present day entirely empirical. In order to discover rational methods we must procure better information on the mechanism of the action of X-rays than we have at present. We know certain factors influencing the susceptibility of cells, as, for instance, the mitotic state or the state of swelling. According to Holthusen's (7) idea, the primary process in X-raying is a photochemical reaction which ought to be governed by the Bunsen-Roscoe law; but this effect is limited during a continuous irradiation by the counter-reaction of the living tissue. In practice, the action of the same dose differently distributed over the same time is found to be very different. The best prospects for heightening the effect of X-rays will be gained by sensibilizing the tumor.

PROPHYLAXIS

The prophylactic treatment, judging by the latest publications, must be regarded as much more problematic than the treatment of manifest cancers, the reactivity of latent cancer foci to X-rays doubtless being still less elucidated than the reactivity of manifest cancers.

Pre-operative X-ray treatment is supposed in some cases to have affected inoperable tumors in such a way that they became operable. This may be said in favor of the treatment of manifest tumors, but cannot be applied to latent cancer.

The main objection to pre-operative X-raying comes from the psychological side, for if patients were to receive one or more X-ray irradiations, they might suppose that they had done all they could in the way of treatment, and it would possibly be too late to operate on them later on. In addition to this argument against pre-operative treatment, there seems to be another: it must be taken into consideration that the X-rayed area contains, besides cancer cells, healthy tissue which, according to present ideas, is the seat of very important factors engaged in combating the malignant growth. I believe that as long as we cannot determine with due certainty what these factors are nor the influence of X-rays on them, we must be extraordinarily cautious in determining the limits of the area to be X-rayed.

REFERENCES

1. Barr, Himwich, and Green. J. Biol. Chem., 1925, lv, 525.
2. Bierich. Muenchen. med. Wchnschr., 1923, No. 36.
3. Idem. Hoppe-Seylers Ztschr., 1925, clv, H 3/4.
4. Cori, C. F. J. Biol. Chem., 1923, lxiv.
5. Glaessner. Klin. Wchnschr., 1925, 4, No. 39, pp. 1868–69.
6. Hofbauer. Gynaek. Congr., Heidelberg, 1923.
7. Holthusen. Lehrbuch der Strahlentherapie. Berlin-Vienna, 1925, I, 803–874.
8. Mayer. Fortschr. a. d. Geb. d. Roentgenstr., 1926, xxxiv, 546–7.
9. Mendel. Klin. Wchnschr., 1925, iv, No. 3.
10. Meyerhof, Lohmann, and Meier. Biochem. Ztschr., 1925, clvii, 459.
11. Schumacher. Klin. Wchnschr., 1926, v, No. 12, pp. 497–499.
12. Warburg. Klin. Wchnschr., 1923, ii, No. 17.
13. Idem. Biochem. Ztschr., 1924, clii.
14. Idem. Klin. Wchnschr., 1926, v, No. 19.

THE ORGANIZED MOVEMENT FOR THE CONTROL OF CANCER IN AMERICA

By GEORGE A. SOPER, PH.D., NEW YORK CITY
Managing Director, American Society for the Control of Cancer

THE American Society for the Control of Cancer was founded in 1913 by a group of physicians and laymen, nine medical societies of national scope and prestige taking part.

The declared objects for which the Society was formed follow: To collect, collate, and disseminate information concerning the symptoms, diagnosis, treatment, and prevention of cancer; to investigate the conditions under which cancer is found, and to compile statistics in regard thereto. Its work is, therefore, educational, epidemiological, and statistical.

The Society seeks to reach the general public and the medical profession with a definite message, namely, that many cases of cancer can be cured if treated by modern scientific methods and at a sufficiently early stage in the disease.

People are taught the symptoms of early cancer and told to apply to physicians immediately upon the appearance of these suspicious signs. Physicians are given the latest facts in regard to diagnosis and treatment, and urged to act promptly in treating the patients or, if necessary, to send them to specialists. Measures for the prevention of cancer are advocated.

In other words, the chief function of the Society is to bring the patients and doctors together at times and under circumstances which offer the best prospect of curing or preventing the disease.

PRINCIPLES AND POLICIES

On December 5, 1923, the Society adopted a formal statement of principles and policies as a guide to its action. Following are the essentials of this statement. They represent the aims and standards of the Society at the present time.

The word "cancer," as used by the Society in its title and throughout its publications, means any and all of those forms of malignant growth of new tissue which usually take the form of a tumor, have a tendency to ulcerate, to extend by metastasis from one part of the body to another, and to recur after incomplete removal. By "control" is meant the prevention of the incidence of cancer and of suffering and death from that disease. The term "American" in the title indicates the territory in which the Society does its work—the United States and Canada.

Up to the present, the dissemination of knowledge has been the chief occupation of the Society. The information which has been used has been mainly that which has been supplied through the voluntary labor of members in the preparation of handbooks, lectures, and papers. The statements have dealt chiefly with the prevalence of cancer, its early symptoms, the irritation theory, radiation, and arguments for prompt recognition and surgical treatment.

The activities of the Society are broad. The Society seeks to control cancer by whatever means experience and investigation show to be useful. It endeavors to survey the entire field of accomplishment by whatever institution or organization or individual useful work is being done. It strives to disseminate its information in the most thorough manner possible.

The Society's doctrine is that lives can be saved by teaching people in the early stages of cancer to suspect their condition and go promptly to competent physicians for diagnosis and treatment. This requires, first, that the interest of the patient shall be aroused in order that he may learn the symptoms and recognize them in himself; if this is not done, he will not suspect that he has cancer until it is too late to be cured of it. After this, he must be convinced, through argument, as to the right course of action to pursue; otherwise he may go to some quack or other incompetent person. Finally, motive force must be supplied in order to lead him to act upon his knowledge and conviction. It is not enough that a person should know what to do; he must be induced to do it. To arouse the interest, to supply the argument, and to furnish the motive force, the Society must make skilful use of the principles of practical psychology.

It is not only necessary to popularize information concerning cancer in order to induce persons who have this disease to place themselves promptly in capable hands; it is also desirable that the members of the medical profession to whom patients apply, should be helped to become as skilful as possible in their diagnosis and treatment. To this end, efforts are made to acquaint them with the latest procedures which they can reliably employ and to warn them against practices which, however promising they may appear to be, lead in the end to disastrous consequences.

The Society hopes that the number of physicians who are capable of dealing skilfuly with cancer will increase. The idea of establishing cancer clinics is encouraged, as is the idea of establishing cancer institutes for the investigation of the cause and cure of cancer, when under university control or other safe auspices. Information is made available to laboratory diagnosticians, radiologists, and nurses, to the end that they may become more efficient. Careful educational work is done among medical students. The exposure of charlatans is aided whenever practicable.

The publications of the Society are as stimulating and practical as it is possible to produce. Above all, it is intended that they shall be accurate. It is believed that they are helpful. They are designed to meet the particular needs of those for whom they are intended. They are not merely general statements intended to do good to whomsoever happens to hear them.

No pains are spared to make the Society's statements definite, explicit, and convincing. There would be no object in making these remarks were it not that some of the aspects of cancer control are very difficult to talk and write about effectively. It is doubtful if there is in the whole range of medical literature a subject so clouded by inaccurate observations, unfounded opinion, and unwarranted generalizations.

CANCER A PROBLEM OF INDIVIDUALS

In a real sense the Society undertakes to deal with individuals. In its communications with patients it confines itself to general instructions and advice. It does not undertake to diagnose or cure specific cases of cancer. Patients who address inquiries to the central office concerning their condition and the proper treatment to seek are referred, when possible, to clinics, to the Society's field officers, and to other local authorities for advice as to where competent medical attention can be obtained in their vicinity.

The Society seeks to maintain and increase its reputation for progressive, helpful, and authoritative statements with respect to the practical aspects of cancer control. Its ambition is to be the foremost authority in the world on the control of cancer. Its office endeavors to formulate statements and statistical expressions of the most unprejudiced and reliable character. The Society constantly strives to increase the number of its established facts and to revise and make more certain its opinions with respect to the prevention and cure of cancer and the amelioration of suffering from this disease as time and the increase of knowledge permit.

The Society has a practical working library containing files of reports of institutions devoted to the study and control of cancer, government reports on cancer, vital statistics, medical journals, recent textbooks, and standard works of reference. The stock of knowledge at the Society's headquarters is constantly becoming more and more complete and serviceable.

The Society stands upon its own feet as a national organization; it is seeking to develop itself as the important public educational force which it is. Attention is being given to its permanent establishment. It is believed that there will always be need of an organization of this kind to lead in the control of cancer.

ORGANIZATION

The Society covers, within the territory of its operations, the United States, including the Hawaiian and Philippine Islands, and the Dominion of Canada.

The administrative organization includes an Executive Committee of 20 members, elected from the Society's Advisory Council, which latter cannot exceed 100 members, and a Board of Directors of 5, who are members of the Advisory Council.

The actual conduct of the executive work is done by a managing director and a small office staff. The Society has a field representative who is a graduate physician.

The Executive Committee meets once a month and, between annual meetings, acts for the whole Society.

The Board of Directors has the general management of the financial affairs of the Society. It supervises the investment and disbursement of funds, and prepares an annual report, which is presented at the yearly meeting of the members of the Society in March.

The Advisory Council considers the activities and management of the Society, and advises with the Board of Directors, Executive Committee, and Managing Director.

The affairs of the Society, that is, the powers and duties of its officers and Committees, are controlled by the certificate of incorporation and by-laws.

The Society has a field organization consisting of a chairman for each state and province, with various committees and subcommittees under them. Over certain groups of states there are regional directors who have supervision over the activities in their districts.

The State chairman, who is always a physician, appoints chairmen of committees for the various counties. These, in turn, have local chairmen under them, when the activities of the organization call for so much administrative machinery. The various local committees are made up partly of physicians and partly of lay persons. The complete organization appropriate for a state is effected in preparation for a period of intensive activity, be it a week or month or longer. When the activity is over, the organization automatically dissolves and only the state chairman remains.

SERVICES

The Society has, from the first, believed that nothing thoroughly successful and permanent could be accomplished in the control of cancer without the full and hearty co-operation of the medical profession. With this idea in mind, it has endeavored, with success, to enlist the interest and support of physicians.

Lectures on cancer control are given to junior and senior medical students. The Society has prepared a small and compact handbook on the diagnosis and treatment of cancer, which has been widely distributed to physicians. It has insisted that all its committees be organized with physicians as chairmen. The Society has received the endorsement of the American Medical Association and of many other professional societies.

The Society has worked in close harmony with the state and local health authorities, and many of its best results, especially in the education of the general public, have been secured through these official bodies.

Instruction to organizations of nurses and to pupil nurses in training is one of the major activities of the Society. Early in its organization the Society received the endorsement of the American Nurses' Association, the National Organization for Public Health Nursing, and the League of Nursing Education, and has since co-operated in every way with nurses either attached to Boards of Health and to the Red Cross, or other non-official health agencies. It has prepared and distributed on request the special pamphlet for nurses entitled, *Cancer Control—How the Nurse Can Help toward Its Accomplishment.*

The education of the general public is carried on in various ways. The Society has since its inception been convinced that a good way to educate large numbers of persons is to secure a large number of members, each new member being a sustaining factor in support of the movement, as well as a nucleus for the dissemination of information. There were about 2,000 paying members in 1925. The Society has a carefully prepared set of pamphlets for the general reader, which is mailed to anyone on request. Individual requests for information are answered personally. Hundreds of letters of inquiry are received annually.

A set of hand-colored drawings illustrating the right and wrong method of going about the treatment of cancer has been prepared. This exhibit has been reproduced by lithography and sent to over 1,000 cancer committees in the United States and Canada. A set of 6 large painted panels with instructive text has been prepared for health exhibits. Two popular film dramas on the cancer problem have been produced and widely distributed.

EDUCATIONAL MATERIAL

Educational material for popular use includes pamphlets on *Cancer Clinics and Consultation Services; What a State Chairman Can Do; Cancer Cures; Fear and Cancer; Danger Signals that May Mean Cancer; The Growth of an Idea; Destroy the Weed;* and *What Everyone Should Know about Cancer.*

Printed "talks" to be given over the radio are sent to state chairmen. Their titles include, *Are You an Ostrich; What the Governor Said; Knowledge and Action;* and *The Greatest Thing in the World.*

Newspaper articles and texts for advertisements to be inserted in the daily press of various parts of this country are supplied.

The Society issues a carefully edited monthly publication called *Campaign Notes.*

Intensive "Cancer Week" campaigns were carried on in 1921, 1922, and 1923. During the first campaign, which was conducted from October 30 to November 5, it is estimated that through publicity measures fully 10,000,000 persons were reached. It is believed that the second "Cancer Week" reached, in one way or another, fully 50 per cent of the population of the United States with the vital message of cancer control. The third period of intensive educational activity was no less successful than the others.

The work of the Society, in so far as paid service is necessary, is carried on partly by means of contributions and dues of members. Special contributions in any amount are solicited. All contributors to the work of the Society receive its publications and are invited to attend meetings, to take part in the direction of the affairs of the National Society, and to participate in the local work in their respective states and cities.

The annual expenditure of the Society for all purposes is about $50,000 per year. About one-half of this amount has been received from the grants of philanthropic foundations and the rest from dues, legacies, and contributions. A campaign for an endowment of $1,000,000 to insure the permanence of the Society's work was begun in 1926. Up to September, 1926, about $400,000 had been collected.

RESULTS

Although it would be desirable to point to a reduction in the death rate or to some other tangible evidence of the Society's success, there is no such measure of its effectiveness in existence. The official mortality reports which are issued by the several states and by the United States are too inadequate and inaccurate to show statistically how many lives have been saved in the last dozen years through the Society's efforts. That there have been many cases of cancer prevented and many cured through the prompt recognition of early symptoms admits of no question.

With the object of obtaining the opinions of persons acquainted with the Society's efforts and thus determining as far as might be the effects of its undertaking, questionnaires were sent during 1924 to the regional and state chairmen who represented the Society throughout the United States, requesting definite answers to five specific queries.

The specific questions were as follows:

1. Whether patients were going to the doctors in larger numbers than formerly, making due allowance for the increased population.

2. Whether patients were applying at an earlier stage in their disease than was formerly the case.

3. Whether there was an increasing realization of the need of better information on the part of the public and physicians with reference to the prevention and cure of cancer.

4. Whether our Society has been really helpful in bringing about the results referred to in these inquiries.

5. Whether our state chairmen knew of any cases of cancer which had apparently been cured as a result of the campaign which has been carried on under our Society's leadership for the last ten years.

Question 1 was answered in the affirmative by all. It could not always be said that there was clear evidence that patients with real cancer were going to physicians in greater numbers than formerly, but it was clear that more patients were seeking advice for conditions that were precancerous. Dr. Joseph Colt Bloodgood, chairman for Maryland, said he was convinced that patients were going to physicians in larger numbers than formerly and that this was largely due to the efforts of the Society.

The almost invariable answer to the second question was that the number of early cases seen by physicians was increasing. Dr. Robert B. Greenough of Boston answered emphatically in the affirmative and attributed the fact to the campaign which had been carried on by the Society.

Question 3 was answered in each instance with the statement that there was an increasing realization of the need of better information on the part of the public and physicians with reference to the prevention and cure of cancer. Dr. F. L. Hupp, of Wheeling, West Virginia, declared that the public was "almost demanding it." Dr. Alson R. Kilgore, of San Francisco, said that the public was definitely interested and remarked that the education of the medical profession was as urgently needed as the education of the public.

The fourth question brought out an affirmative answer from all the correspondents. Dr. Edward H. Risley, of Waterville, Maine, said he believed that the Society had been extremely helpful, but that the efforts would have to be continued for a good many years. Dr. Wilbur H. Harris, of Toronto, Canada, replied that patients were consulting physicians in greater numbers than formerly, at an earlier stage of their disease than previously, and that the Society should have the credit for this good result.

In answer to the fifth and last question many of the correspondents gave specific instances of cases in which persons with definitely diagnosed cancer had been apparently cured as a result of the campaign which had been carried on by the Society.

THE EVIDENCE OF THE VALUE OF EDUCATION IN THE CONTROL OF CANCER

By JOSEPH COLT BLOODGOOD, M.D., Baltimore, Maryland
Associate Professor of Surgery, Johns Hopkins University, Baltimore

THE records of 36 years give ample evidence that the control, cure, and prevention of cancer, up to the present time, have depended entirely on the education of the medical profession in the known and well-established methods of diagnosis and treatment, and the getting of correct information to the people on the earliest signs of cancer, so that, when warned, they will without delay seek examination and treatment from the best informed medical talent. *When both the medical profession and the public were ignorant, cancer throughout the world was a hopeless disease.* One has only to read the records of the great surgical pathologists—Billroth, Velpeau, Paget, Koenig, Gross, and Warren—to learn that before 1890, because of the ignorance of the public and the incompleteness of the radical operation by surgeons, cancer was rarely cured and was never prevented.

Between 1890 and 1900 the radical operation for cancer was practically developed in all its details. Conspicuous in this period are the great improvements in gastric surgery originated by Billroth and carried on by the Mayos, Hartmann and others, and Halsted's conception and execution of the complete operation for cancer of the breast. During this decade, up to 1900, the dissemination of the details of the operative technique of the radical operation for cancer was very widespread, but the people were still ignorant. For this reason a marvelously conceived and a wonderfully executed bloodless dissection by trained surgeons, assisted by trained teams in well-equipped hospitals, rarely accomplished a cure, because the attack upon cancer took place in a late and incurable stage.

Up to 1900 the mental vision of operators was limited to diminishing the operative mortality and to eliminating wound infection. The operations were long and tedious. The extra energy was devoted to pathology.

Between 1895 and 1900 the bookkeeping of the final results began. The surgeons could take pride in their low mortality and the disappearance of wound infection, but there was very little encouragement in the number of 5-year cures. When these 5-year cures were critically examined, many were found to be in borderline pathological processes, which we even then suspected might not be malignant. Those students who restudied their records with a magnifying glass found a few living patients, who proved to be bright lights pointing to the two great factors in the operative cure of cancer—the earliest possible intervention, and the anatomically complete operation, as based upon the knowledge of the pathology of the local growth and its possible local infiltrations.

The expressed opinion of the medical world today stands behind the statement which I repeat again: The cure of curable cancer depends upon two factors—the earliest recognition, followed by immediate complete operation. The further development of the cautery as a substitute for the knife, or the introduction of X-rays and radium has not altered this opinion.

I trust I shall never overlook an opportunity to record my thanks to Halsted and Welch and the environment of the Johns Hopkins Hospital and its pathological laboratory for the opportunities offered me for the study of the surgery and pathology of all the patients operated upon in the Surgical Department.

In 1902 I made a complete study of every benign and malignant tumor treated in the Halsted Clinic at Johns Hopkins. In practically every case the ultimate result was known and the duration of the local disease. As the histories were very complete, we were able to study most of the factors as well as we can today. These studies were published in mimeographed form and were used for teaching for almost ten years.

In 1910 I made a second study of the same kind and was able to contrast the different factors which seemed to influence the percentage of 5-year cures. These papers were read before the American Medical Association and published in its Journal.

Up to this time, 1910, there was no united effort on the part of the medical profession as a whole to instruct the public on the necessity of the earlier intervention in malignant disease. Nevertheless, some correct information in regard to the surgical treatment of various diseases and the importance of having that operation in time was reaching the public. Most of the messages must have been transmitted by the conversational method. True, there was a great deal in the public press about appendicitis, and even a campaign of ridicule in *Life* on the unnecessary and costly operations. My studies in 1900 and 1910 showed a very rapid diminution in delayed operations for appendicitis and strangulated hernia; that is, the percentage of peritonitis due to appendicitis and gangrene of the gut in strangulated hernia, and peritonitis in its late stage from perforated gastric and duodenal ulcer, all showed a rapid decline. These almost invariably fatal complications of the primarily curable lesions are the results of ignorance and delay.

As was stated before, there was in 1900 some little evidence of improvement in the percentage of 5-year cures among the operable group of malignant disease. By 1910 not only this improvement was distinct, but also its factor, the short duration of the disease.

In 1913, in the United States, the American Society for the Control of Cancer began its work of broadcasting the correct information in regard to cancer. Without much doubt the daily press and magazines have been the most helpful agencies in this attempt to educate the people with regard to cancer. In spite of the influence of the war, my own studies of the statistics show continuous progress. There was greater improvement between 1913 and 1915 than between 1900 and 1913. Since 1920 the improvement has been so great and startling in those communities in which the educational campaign has been most intense that there can no longer be any doubt that until we find a specific cure or preventive for cancer, the only method of control is through the education of the public.

Those who may now claim credit for this must remember that the demand for earlier recognition and operation for cancer is no new cry. There have been many previous "voices crying in the wilderness." John Hunter in the early 1800's started a society to educate the English in regard to cancer, but the mails were so slow that it was given up. It seemed that the cancer patients died before they got their letters. Snow, before 1890, wrote that the only cases of cancer of the tongue which could be cured were those in which the local lesion on the tongue was so small that it could be removed with a pair of scissors through the mouth. Johannes Hutchinson constantly wrote in his *Archives of Surgery* before and after 1890 on the importance of earlier intervention in malignant disease. All the older authorities seemed to appreciate that the duration of the disease was a distinct factor. They, however, exaggerated the factor of the pathological type of the malignant disease. Halsted, in his teaching, constantly referred to the importance of earlier recognition and treatment.

It is a remarkable fact, and one not at all to the credit of the human intellect, that the medical profession kept this knowledge, which was essential to the life of their patients, largely concealed. As S. Hopkinson Adams said in 1912, the medical profession tried to educate the public secretly. Medical ethics, a strong weapon of conservatism, has been the greatest block to publicity.

Let me give you some of my own figures, which picture with mathematical precision just what the publicity of correct information has accomplished in the control of cancer. I will compare the figures of the first decade, up to 1900, with those since 1920. In general, inoperability has decreased from more than 50 per cent to less than 10 per cent. This gives at least 40 additional individuals out of 100 the chance of a possible cure. There is no doubt but that when the complete operation is performed in earlier stages of cancer, even after metastasis has taken place, these patients will be spared the terrible punishment of local recurrence which may be just as painful and horrible as the primary inoperability due to the ignorance of delay. My own studies bring out this fact very clearly.

In addition, X-rays and radium generally relieve and control the intense agony of metastasis about the spinal nerves. When the uninformed individual delays until that stage in which 50 per cent are inoperable, the chances of a 5-year cure of the remaining 50 per cent which are operable are less than 20 per cent; so that the curability in this late stage for all is less than 10 per cent. When the informed individual, with confidence in the medical profession, answers the message of the easily recognized warning at once and seeks an examination from good medical advisers, the chances of malignant disease being inoperable and hopeless vary from 3 per cent to 10 per cent in the different types of cancer in the different localities. The chances of cure in the remaining group vary from 50 per cent to 100 per cent with the different types in the different localities. With these figures I am considering only cancer of the skin, oral cavity, breast, stomach, colon, rectum, uterus, and bone.

SARCOMA OF THE BONE

Since the results of the amputation of the extremities up to 1921 became evident in 1926, we are forcibly impressed with the fact that the widespread interest in bone tumors since the war has brought patients with sarcoma of bone for examination by the X-ray at so much earlier a period that amputation of the lower extremity now offers more than 30 per cent of cures, while in 1918 the percentage of 5-year cures was less than 8. In the Johns Hopkins Clinic the first patients to live 5 years or more after amputation for sarcoma of bone entered the clinic in 1913. In the first 23 years there were but two 5-year cures. In each year since 1913, up to 1921, a period of only 8 years, the percentage of 5-year cures after amputation for sarcoma of bone of the lower extremity had increased from less than 8 per cent to more than 30 per cent. This improvement has not been influenced by radium, X-ray, or toxins. The only demonstrable fact has been that the parents of the child, or the adult, influenced by correct information which has come in various ways, have sought an examination very quickly after the first warning. The insignificant pain or tenderness, the slight swelling or limp, or the sudden fracture, immediately followed by the X-ray, has revealed the earliest bone lesion.

Up to the present time, neither in the Codman series of the bone registry, nor in my own, has there been recorded an authentic case of a 5-year cure after amputation of the upper extremity. But in the last 3 years in my own observations, 5 examples of sarcoma of the bone of the upper extremity have come under observation at so early a period that we have been able to resect. This had not happened before. These patients are living and may ultimately become 5-year cures (if the automobile permits).

There is nothing more striking than this earlier recognition of all bone lesions. It is a progressive stage which can be explained only by the publicity of correct information given to a larger group of more intelligent people.

CANCER OF THE BREAST

Apparently there has been the greatest publicity of the facts in regard to breast lesions. There is no question but that the percentage of inoperability since 1920 in my clinic has reached about 5, while previous to 1900 in the Johns Hopkins Clinic it was more than 50. The proportion of malignant to benign tumors in the group subjected to operation has changed from 80 per cent cancer and 20 per cent benign to about fifty-fifty.

A new group has appeared, that of benign lesions in which operation is not indicated. This has increased from less than 1 per cent to more than 60 per cent. In educating the public in any disease, we must reckon with this group, because the warnings of cancer are not different from those of the local lesions which are not cancer. This group increases, at least temporarily, our diagnostic difficulties. As the percentage of individuals of this class increase in any one clinic, so will decrease the proportion of hopeless cancer, and so will increase decidedly the percentage of 5-year cures of malignant disease by the complete operation. And there is no doubt but that there will be a great increase in the percentage of breast tumors which are not yet malignant. These early benign, but precancerous, breast tumors are rarely seen except in clinics in which the percentage of correctly informed individuals is very large. These tumors can be differentiated only at the exploratory operation, and the final decision rests upon the microscopic study and properly stained frozen section. I have begun to appreciate this group most since 1920, and I feel that we are justified in making the statement that these women are really protected from or cured of cancer by the removal of the tumor only.

But this is not all of the good that has been done, or the lives that have been saved by the message to women. Paget and all who have observed his type of cancer, originating in the nipple and extending to the breast, knew, and know, that there has never been a recorded cure of Paget's type of cancer, in the stage in which he described it, by the complete operation. I have observed from year to year a gradual improvement in cases of Paget's cancer. When the lesion is seen early, while still confined to the nipple and axillary glands, the percentage of 5-year cures agrees with that of primary cancer of the breast: 70 per cent if the glands are not involved and 25 per cent if the base glands only are involved. But there is a still more important observation to record. Paget's cancer, like cancer of the skin and of the mucous membrane of the mouth, never begins as cancer *de novo*, but is always preceded by a well-known and easily recognized precancerous lesion. On the nipple it is either first a wart or a keratosis, or a red granular area. This local lesion, if untreated, may ultimately develop into cancer. I now have a large number of patients in whom the local lesion has disappeared after cleaning with soap, water, and alcohol, and protecting with a vaseline or yellow oxide of mercury ointment. Then there are cases which either do not react to treatment or whose appearance indicates that it is too late to try such measures. When cancer is not definite, the lesion of the nipple, or the entire nipple itself, is excised with the cautery and a frozen section made. If there is no evidence of malignancy, the breast is saved. Paget's lesion of the nipple which leads to cancer is of course a relatively small group. But correct information should save every one from cancer.

Therefore, our message to women should be: If you feel, or think you feel, a lump in the breast, or if you notice the slightest irritation of the nipple, see your medical adviser at once.

CANCER OF THE CERVIX AND UTERUS

My experience here is more recent and much less extensive than with the breast, oral cavity, bone, stomach, colon, and rectum. Nevertheless this experience and the literature seem to indicate that the correct message of the medical profession either has not reached the women of America, or, if it has been received, false modesty or some other factor may explain their delay.

The development of cancer of the cervix to a hopeless local condition may be so rapid that a few months' delay after the warning of an unusual discharge or its reappearance after the menopause may spell disaster. My recent experience compels the conclusion that the best protection from cancer of the cervix for women who have borne children is the immediate repair of all injuries of childbirth, and periodic examinations.

In spite of the great promise of radium, and the fact that radiation offers palliation when cancer of the cervix has extended beyond any possible operative removal, the percentage of 5-year cures has been little affected except in early cases which have been brought under observation by education. The publicity given to radiation for cancer of the cervix has been so much greater than the publicity for cancer in any other locality that we should expect far better results. It is this evidence which leads me emphatically to favor periodic examination.

CANCER OF THE SKIN

The development of inoperable or incurable cancer of the skin is entirely due to ignorance, which leads to delay in the proper treatment of a definite skin lesion.

At the present time it seems less difficult to educate the public to seek an examination for a congenital or acquired skin defect in ample time than to teach the medical profession what skin defects should be removed. Again, my observations show that many surgeons do not realize the danger of the incomplete removal of an apparently innocent skin lesion. Education of the public and of the profession has already profoundly reduced the number of deaths and of unsightly deformities due to neglected or improperly treated cancer of the skin. Through the education of the public and the profession, cancer of the skin can be eliminated from the mortality sheet of the Census Bureau.

CANCER OF THE ORAL CAVITY

My studies here have been continuous for years, and very extensive. No group shows better the good influence of the education of the public and the profession. In my records, the figures are even better than those for the breast.

When we compare the character of the local lesions of the mouth observed before 1900 with those since 1920, we find that inoperability due to a hopeless local growth has decreased from more than 50 per cent to less than 10 per cent. Early cancer of the oral cavity, with the possibility of cure in 70 per cent or more, has increased from less than 3 per cent to more than 60 per cent, while late cancer, still operable, with the possibility of cure of less than 10 per cent, has decreased in proportion. Lesions of the mouth that are not malignant, whether distinctly precancerous or not, have increased from less than 3 to more than 60 per cent.

The factors which lead to a lesion which may produce cancer in the oral cavity are now known and accepted. Through *education* these factors can be removed and controlled: ragged, dirty teeth; the irritation from excessive use of tobacco, and the pressure of ill-fitting plates. I am confident that periodic examinations of the teeth and mouth by well-informed dentists will absolutely protect from cancer of the mouth, as well as from many other serious diseases whose portal of entrance is through root abscesses, pyorrhœa and other lesions of the mouth and teeth. This message I have given to the people and to the medical and dental professions for years.

I have one new message, the importance of periodic X-ray films of the teeth of all adults over 45 years of age who have pyorrhœa, especially of those who are users of tobacco; also the danger of carrying restoration of, or over, the remains of teeth too far. Complete extraction and properly fitting plates are a very safe substitute for any type of restoration. I believe that it is the duty of the two professions to popularize plates as against bridge work and a continuous tinkering with pyorrhœa.

CANCER OF THE STOMACH, COLON, AND RECTUM

The evidence of improvement is but slight in this group. There is only one explanation. Abdominal symptoms, which may be grouped under the term "indigestion," are a common human ailment, and the warnings of this simple indigestion are not in the beginning different from the warnings of the indigestion which precedes cancer. Then again, the examination is more costly in time and instruments of precision. No examination of the abdomen is complete without the use of X-rays (both fluoroscopic and rœntgenographic), proctoscopic inspection, and gastric analysis.

My recent studies, since 1920, have shown a great diminution in the percentage of inoperable cancers of the stomach, colon, and rectum. The educational influence has increased the operable group, but has not as yet had much influence on the percentage of 5-year cures.

The number of persons in the United States who are being given a complete gastro-intestinal study in the private and public clinics is very large, and has increased rapidly since 1918. But the majority of these people have suffered for months or years without such an examination, so that if the lesion responsible for their symptoms is, or has become, malignant, the chance of a cure has passed or is greatly reduced. We must attempt, in our educational effort, to influence this group, who are now crowding our gastro-intestinal clinics, to seek this thorough examination earlier, as a first resort, and not later, as a last resort. There is no doubt that, as periodic examinations of adults become more general, cancer of the colon, stomach, and rectum will be more frequently recognized in the operable and curable stage.

DISCUSSION

Dr. A. C. Strachauer, Minneapolis: Dr. Soper stated in his paper that the American Society for the Control of Cancer was started thirteen years ago. In Minnesota we have been carrying on educational campaigns from the time of the organization of the Society. Various methods have been employed, including public lectures, lectures before the annual dental conventions, nursing conventions, public health demonstrations, and post-graduate courses of instruction at the University for practitioners. We have given as many as fifty lectures throughout the State in the course of a single year's campaign.

As a result of this educational work, patients are coming earlier and earlier to the individual physician, to hospitals, and to the cancer institute. Within the last month a woman consulted me on the discovery of a slight dimpling in her breast. No lump had been found and it was only by the most painstaking palpation that a slight induration under the dimpling could be detected. A biopsy showed the presence of cancer. On questioning, the patient stated that she had read in a popular magazine that dimpling of the breast was suggestive of cancer or tumor. This is only one case from among many. Surely, results as demonstrated by this case are worth working for, and Minnesota owes the American Society for the Control of Cancer a great debt.

In making our effort to educate the people to request early examinations we found that we had no special facilities for caring for them. To meet this need the Citizens' Aid Society of Minneapolis made the University of Minnesota a gift for the erection of a 50-bed cancer hospital with complete equipment for the diagnosis and treatment of cancer, including a deep X-ray therapy outfit and a little less than a gram of radium in both the salt and emanation apparatus. This equipment includes an endotherm knife which has given good satisfaction and which we find very valuable in certain conditions.

The Minnesota Cancer Institute is an integral portion of the hospital system of the medical school and enjoys the ideal status referred to by Dr. Welch, of Johns Hopkins, in his discussion. Accessibility to the general facilities of the entire medical school, to the scientific departments of the university at large, and to the services of the medical school hospital system and administration is afforded by this arrangement. I am pleased to state that the collaboration thus made possible is proving very satisfactory. The Institute has its separate staff of surgeons on continuous service; has its own pathologist and pathologic laboratory and a full-time physicist.

The Institute is intended primarily for the care of persons afflicted with cancer. Its next purpose is for the dissemination of educational facts, and while a considerable amount of research can be carried on, a separate establishment for this latter phase of the problem is hoped for in the near future.

It is my belief that if the medical profession will wholeheartedly co-operate and participate in the campaigns for the control of cancer, as a result of such education every state in the Union can be provided with similar institutes and that funds will be forthcoming from private sources or from state appropriations to build them.

Dr. William S. Stone, New York City: I am sure that we are all impressed with the importance of this Symposium, and are anticipating much that must follow these discussions of the educational efforts which this Society initiated and has already carried out so successfully during the past few years.

In order to make this work more effective in the future, however, it may be helpful to review briefly some of the results which have already been obtained, and to suggest wherein our educational work has, perhaps, in a measure failed. For this purpose, therefore, it may be of value to give some observations which have been made in the admission department of the Memorial Hospital during the past decade.

The marked increase in the number of applicants has a special significance in showing a decided change of attitude on the part of both the public and the medical profession toward a hospital devoted entirely to the study and treatment of malignant diseases. The improvement in the larger number of cases with earlier lesions demonstrates this change of attitude more than the increase in the total number. In this direction the sympathetic attitude of the public has increased faster than that of the profession.

A most encouraging sign of progress is in the number of patients, especially during the past two years, who have presented themselves, either on their own initiative, from their knowledge acquired from the public press, or by recommendation of the friends and relations of old patients of the hospital.

At the present time a palliation may be expected in the majority of instances, but the curable cases are still few. The surgeon rarely refers a case until after an operation has been performed, and there is still considerable delay in referring patients with recurrences.

The most satisfactory evidence that our educational efforts are becoming productive is the increasing number of patients who have applied during the past year to ascertain if they have a cancer. The largest increase of applicants has been among those with skin affections, a class of cases which presents an increasingly important problem because of the large number with moles, birth marks, etc., about which there is still so much confusion in our knowledge of their nature and importance. Nothing illustrates better our increasing responsibilities in diagnosis and treatment.

Of the so-called major tumors, the results of public education have been best shown in the rapidly increasing number of women who present themselves with lumps in the breast, anxious to know if these lumps are malignant, or if they will become so. The majority of them, of course, are benign, but here again the importance of accurate diagnosis and sound advice is offering a serious problem.

Public education has apparently not progressed so far as it should in acquainting women and the profession with the facts relating to uterine cancer. It seems as if this were a field in which our educational efforts might be made most productive. Early and curable cases with this disease are still very few, and apparently for the following four reasons: (1) the tradition among women that irregular uterine bleeding during the fifth and sixth decades is a normal manifestation of the "change of life"; (2) the fear of an operation; (3) the still frequent failure of physicians to make a pelvic examination of their patients who give symptoms of uterine disturbance at this period of life; (4) the fact that uterine cancer gives no characteristic symptoms until it is well established.

It would seem, therefore, that, in addition to giving lectures on cancer in general, special lectures ought to be given upon the individual organs and the special conditions in those organs from which cancers arise. In fact, a special campaign at the same time all over this country, directed to women for the purpose of acquainting them with the actual facts about uterine cancer, cannot help but materially and immediately reduce the mortality from this disease. It is a curable cancer, curable by radium as well as by an operation, and why not tell women that fact? It appears to be the most fertile field for our educational work, and why not make it, for a time, the chief field for our endeavors?

Finally, along with our efforts to educate the public relative to the curability of the disease in its early stage, the profession must meet the problem of the difficulty of diagnosis in the early stages. Even if periodic examination becomes a custom—and it certainly should become such—the problem of early diagnosis and proper treatment only become to us matters of increasing importance. The entire problem appears to be an institutional problem, which can be best solved in a cancer hospital, unless in a general hospital a cancer unit is maintained with all the equipment and co-operation which a modern cancer hospital can offer.

SIR JOHN BLAND-SUTTON, London: As an illustration of the progress that has been made, I should like to speak of cancer as it was taught to me, as compared with the way in which it is taught today. We used to hold consultations as to whether an operation was justifiable or not. If there was any doubt, all the consultants advised waiting until the lymph glands became involved, and that signified hopelessness. I have often heard a man reproved for operating before the lymph glands were involved. I merely want to emphasize the difference among surgeons as recently as 1884 and today.

THE PREVENTION OF CANCER

By JAMES EWING, M.D., New York City
Professor of Pathology, Cornell University; Director of Cancer Research, Memorial Hospital, New York City

IN the control of cancer, prevention must eventually play a prominent rôle. Although a great body of clinical information shows that many forms of cancer are due to preventable causes, there has been little systematic effort to impress this fact on the medical profession or to convey it to the public. Yet, in spite of inspired surgical statistics and the ambitions of radiotherapy, the death rate remains without appreciable change. Early cancer is often a very difficult therapeutic problem. The major forms of cancer when fully established carry a very high death rate. Advanced cancer is likely to long remain an unsolved problem.

There are many reasons for the current neglect of the prevention of cancer. Many forms of the disease, especially those to which Cohnheim's theory applies, are not preventable. But these need not concern us now, and fortunately the major forms of cancer are not of this class. Even in this extensive group of cases chronic irritation probably acts as a very frequent exciting factor. There is much evidence to show that the great majority of tissue rests remain quiescent until excited to growth by some form of disturbance in circulation and nutrition. The doctrine of tissue predisposition, in its various forms, becomes less and less satisfactory, the more carefully we investigate the exact conditions of origin of the major types of cancer.

Another obstacle is the general assumption that cancer is the result of hereditary tendencies which express themselves in the so-called spontaneous outbreak of the disease. One need not depreciate the importance of the experimental evidence regarding hereditary factors in cancer in order to remove this hindrance to the prevention of the disease. The importance of heredity must be accepted in a considerable list of less frequent forms of cancer, as recently enumerated by Wells. One may cheerfully accept all the data secured by Slye and others regarding the influence of heredity in mouse tumors, intensified by selective breeding, and still see that the hereditary tendency is not the disease itself, that the usual exciting factors must be brought into play, and that in hereditarily predisposed subjects the preventable factors may be successfully excluded.

It appears that the human race enjoys a general susceptibility to the disease, which, however, rarely expresses itself unless extraneous exciting factors are brought into action, while the hereditary tendency may be present to an extreme degree without result unless some of these factors are at work. Nevertheless I do not believe that heredity can be dismissed from practical consideration in the origin of cancer. It is probably sound advice to offer the public, that when there is a strong tendency to cancer in the family the members of that family may well take unusual precautions against the disease. Nothing in the genetic study of cancer seems to justify the general interdiction of intermarriages among such families. It is important to remember that individuals inherit the family habits and environment of their forebears, and that these factors may explain some of the observations suggesting an influence of heredity.

Another far more serious obstacle is the widespread assumption of the parasitic theory of the origin of cancer. If cancer is due to the action of an unknown, microscopic, perhaps ultramicroscopic, universal parasite, then effectual prevention must wait upon its discovery. At the present day, I have no hesitation in committing myself without reservation against this theory. With most general pathologists, I regard it as incompatible with the known facts about cancer. The assumption of a universal cancer parasite can be held only by those who assume in addition that cancer is a single disease, comparable to syphilis or tuberculosis. This assumption appears to be untenable. Cancer is not a single pathological entity, but a great group of diseases, of very varied origin and course. Virchow divided biological processes into three grand classes: normal growth and functional changes, inflammation, and neoplasia. Neoplastic reaction of tissue cells is comparable to inflammatory reaction. There are about as many neoplastic diseases as infectious diseases, and no more reason for assuming a single origin for the one than for the other group. If there were less anticipation of the imminent discovery of the universal cancer parasite, fewer announcements of its demonstration, and more recognition of the specific exciting factors in cancer, the cause of cancer control would be benefited.

Finally the chief difficulty in arousing interest in the prevention of cancer is found in the necessary absence of immediate tangible results. Since the major forms of cancer are largely the result of human habits and bad habits, a certain intelligent reformation of the habits of the race must be accomplished before cancer prevention can show very tangible results. There is all the more need of approaching the subject with a sane systematic program.

A rational basis for the prevention of cancer lies in the fact that the major forms of the disease are due to some form of chronic irritation. It is a sane and profitable and yet tedious occupation, that has long been pursued, to investigate these chronic irritations that lead to cancer. While in many instances, we have rather accurate information regarding them, in many other conditions our knowledge is very unprecise and even impressionistic. Generally the knowledge is based on clinical observation, but in some cases it is supported by experimental data, while in others there is hardly any real information available.

In the intelligent treatment of precancerous diseases and precancerous lesions the medical profession is daily performing a service of great importance in the prevention of cancer. The list of these conditions is very long and their significance generally well organized. Yet in all the medical specialities this service is often very defective, and there is little doubt but that much more could be accomplished if the education of physicians was made more specific regarding the dangers of these conditions when untreated. I mention only two cases in which the deficiencies are most notable: the removal of pigmented moles to prevent melanoma, and the drainage of the infected antrum to prevent cancer of the antrum and nares. All types of chronic infections and irritations should be scrutinized carefully for their possible relation to cancer.

Among preventable cancers the most obvious is the intra-oral group. It has long been known that cancers of the lip, mouth, tongue, and tonsil are due to bad teeth, tobacco, and syphilis, and the importance is, I think, in the order named. Experience in a large clinic for these diseases reveals, on the average, an astonishing degree of irritation due to these factors. Broken, decayed, and projecting teeth continually tear the adjacent mucosa. Sound teeth slightly out of alignment, but with sharp edges, are often responsible. Pyorrhœa often adds an effective irritant, especially in cancer of the floor of the mouth. Elaborate plates containing various metallic alloys are particularly irritating to some mouths.

The public and the dental profession should be made fully acquainted with the dangers of all these conditions, and the dental profession should be urged to take a lively interest in the necessity of buccal cleanliness and sound dentistry for the avoidance of buccal cancer.

Cancer of the lip is nearly always caused by the irritation of tobacco but a prominent predisposing factor is seborrhœic dermatitis and inflammation of the vermilion border. Small indurated infiltrating cancers develop at points of mechanical irritation or at fissures of the lip, but seborrhœic dermatitis gives rise to broad flat cancers, which develop and extend sometimes very rapidly. Wide provision and use of free dental clinics would aid in the reduction of buccal cancer. The use and especially the abuse of tobacco must be charged with a large share in the production of intra-oral cancer as well as of cancer of the larynx and probably of the œsophagus. With many other observers, I believe it is the main cause of leucoplakia. Its effects may continue long after the cessation of the tobacco habit. It is particularly effective when combined with bad teeth and infection. A large proportion of buccal cancers arise in tobacco users who have bad teeth and ill-fitting plates and dental bridges. When "white spot disease" arises in such a subject it is difficult to prevent the eventual outbreak of cancer, so that these conditions should be corrected before a serious situation develops. One may hardly aim to eliminate the tobacco habit, but cancer propaganda should emphasize the danger signs that go with it.

Syphilis occurs in a high proportion of lingual cancers, but it appears to be less serious in itself than the other exciting factors, bad teeth, infections, and tobacco. It becomes much more serious when combined with these chronic irritants.

Chronic infections, when established in the mouth, base of tongue, and tonsils of subjects with bad teeth, with or without the irritation of tobacco and the scars of syphilis, are very important additional exciting factors of cancer in all these regions. To combat these infections and general buccal uncleanliness I have ventured to recommend a very simple remedy, namely, the regular use of soap gargles, and I am quite serious in making this recommendation. In spite of many formidable efforts, no discovery of an effective buccal bactericidal agent has ever been made. Buccal uncleanliness is responsible for so many diseases that one may well add to current cancer propaganda the old French proverb, *La mort entre par la bouche.*

Cancer of the external genitals in both sexes is nearly always traceable to various forms of uncleanliness of these organs. Circumcision would reduce the incidence of cancer in the male about 2 per cent. It is not improbable that this simple operation would also reduce the incidence of uterine cancer. Cancer of the uterus is distinctly less frequent in Jewish women than in some other races.

In the origin of cancers of the skin predisposition plays a large part. The predisposing factors are found in an abundance of suppressed hair follicles which give rise to many rodent ulcers; in the special sensitiveness of certain skins to the effects of wind and sunlight (seaman's skin, xeroderma); in the overdevelopment of sweat and sebaceous glands in persons with oily skins (seborrhœic dermatitis), and in the occurrence of congenital pigmented moles. None of these predisposing conditions are very obscure or beyond the comprehension of a layman. With all of them the factor of chronic irritation in some form is generally necessary for the outbreak of cancer.

Persons with oily skins and heavy growth of coarse hair should know that vigorous and frequent scrubbing with soap and water are required to rid the skin of accumulating secretions. The small persistent nodules in the skin which mark the beginnings of basal cell carcinoma should be recognized and treated early before they become true cancers. The scaly spots and keratoses which appear at many points on the hands and face of persons with sensitive skins should be regarded with suspicion and treated with care.

Only a small proportion of brownish spots or moles in the skin are known to be dangerous. These are almost invariably marked by certain characteristics. They are located in positions where they are exposed to friction and injury, as along the neck, on the face, and especially on feet and toes, where they are generally overlooked. A very dark color is a suspicious sign. Any definite sign of growth calls for immediate attention. A warty character with growth of hair is sometimes, but not always, of serious moment. The free excision of all suspicious moles presenting any of these characters, and of all pigmented moles in exposed situations, would greatly reduce the incidence of fatal melanoma. All physicians should know that some melanomata are not pigmented and that the initial treatment of every cancer of the skin should be undertaken with a lively sense of responsibility.

Cervical uterine cancer is another form of the disease which is largely preventable, but the difficulty of applying our knowledge of its causes is much greater than with intra-oral disease.

The main factor in the causation of cervical cancer is the presence of cervical lacerations, especially neglected ones. All statistical reports agree that cervical cancer is far more frequent in child-bearing women than in nulliparæ, and close clinical observation shows that neglected chronic endocervicitis precedes the disease in a great majority of cases. One has to admit that precise knowledge of the character of the inflammation or infection makes little difference, so long as there is established an interrupted healing process in cervical erosions and lacerations. Chronic arteritis is said to be a contributing factor, and a syphilitic element is often overlooked.

Since early cervical cancer gives no specific symptoms, one cannot here rely upon early diagnosis. Cancer propaganda has brought many women to the surgeon and radiologist in earlier stages of the disease but has not greatly reduced the mortality.

There are two resources available, the insistent repair of cervical lesions after childbirth, and periodic examinations, during and after the child-bearing period. Since cervical cancer develops abruptly, and advances to a serious condition in many cases within a few weeks or months, these examinations must be made at least every six months, in suspicious cases, and once a year in others.

The practical difficulties of instituting such measures for the general population are very great. A free clinic for the diagnosis of cancer of breast and uterus, established some years ago in Philadelphia, was soon abandoned from lack of attendance. Greater care on the part of obstetricians and gynecologists, and systematic education of women themselves regarding the causes and signs of the disease and the necessity of local cleanliness are required before the prevention of uterine cervical cancer can be made to tell against the high mortality of this disease.

A particularly pernicious belief widely held among women of all classes is that bleeding often marks the onset of the menopause. More often it is the signal of well established and ulcerating cancer.

Endometrial cancer is referable to so many different factors that any plan of prevention seems to be out of present reach.

Œsophageal cancer has a mortality of 100 per cent and an early diagnosis can hardly render these cases susceptible of cure by any method. In the extensive statistical study of Berencsy and Wolff at Budapest, œsophageal cancer stood fourth in order of frequency. Is there any basis for the prevention of this condition?

The importance of congenital diverticula and short blind sacculi in the origin of œsophageal cancer has been pointed out by Heller, Ritter and Glinski, and others, but these canals occur mostly at the level of the cricoid, while Kraus found only 158 cancers at this region to 699 in the middle and lower thirds. The islands of mucous glands interrupting the squamous lining are most frequent in the cricoid region. While a certain proportion of cancers may be referred to these abnormalities, and to constrictions from disease of trachea and bronchi, the great majority of cases exhibit none of these predisposing factors and the disease must be assigned to chronic irritation. From personal contact with a large number of these unfortunate subjects, I have been impressed by the obvious sources of chronic irritation which they usually present. The same conditions in the mouth that lead to buccal cancer are often found in œsophageal and gastric cancer. Alcohol, tobacco, and the bolting of hot, irritating, imperfectly masticated food must be regarded as highly important in the causation of œsophageal cancer. To preach to the public the correction of such habits and conditions seems to be the sole method of attack on this very frequent malady.

Of the causes of gastric cancer, many would say we know nothing. Assigning 5 to 10 per cent of gastric cancers to gastric ulcers, the excision of ulcers may be given credit for the prevention of a small proportion of cancers, but at the cost of considerable mortality.

Experienced clinicians point out that gastric cancer arises in two types of subjects, one with an athletic stomach, the other with an irritable stomach that has long given trouble. Heredity may play a part in gastric cancer, probably as much through the inheritance of dietary habits as from any intrinsic tendency toward cancer. Yet Sir Berkeley Moynihan is quoted as stating that Napoleon, the great example of hereditary gastric cancer, did not die of this disease.

To assert that gastric cancer is mainly due to abuse of the stomach is perhaps without adequate scientific basis, but this opinion is strongly supported by what we know of the beginnings of gastric cancer, its chief location in the pyloric region, and the dietary habits of the majority of the subjects. Man is the only animal who lives a long natural life with unrestricted access to unlimited quantities of food, and he is the only animal who suffers from gastric cancer. Habitual overeating is a nearly universal human practice.

The beginnings of gastric cancer have been best revealed in the study of Verse, who in 20,000 autopsies at Leipzig found 12 early unrecognized gastric cancers. They were all small adenocarcinomatous elevations with slight erosion and infection, lying in the pyloric region in stomachs which showed general signs of catarrhal inflammation.

The study of the history of gastric cancer reveals as a rule somewhat intangible evidence of definite gastric abuse, but in a great many cases the abuse had been obvious.

We are probably in a safe position to point out to the public that the commonest and one of the most fatal forms of cancer is due to habitual abuse of the stomach. In a large proportion of the more intelligent classes such a dictum might not be without tangible results.

Cancer of the rectum stands fifth or sixth in order of frequency. If one chooses to urge constipation as a cause of cancer, he should reserve it for the rectal disease. Here again one encounters a complex field because of the numerous anatomical conditions that predispose to cancer, probably through interference with the normal and complete evacuation of the organ. The normal septa of the rectum may be exaggerated. There may be abnormal epithelium-lined canals leading from the rectal mucosa. A variety of diseases and abnormalities of the tissues and organs about the rectum may interfere with its mobility. The anal region is of necessity predisposed to uncleanliness and to a variety of saprophytic infestations and bacterial infections which may readily pass the anal sphincter. With this series of predisposing factors it is not unreasonable to assume that chronic constipation often adds the decisive factor in producing rectal cancer. While present data do not seem to warrant us in attributing the majority of rectal cancers to chronic constipation alone, it is safe to urge that this condition should be avoided for the direct purpose of preventing cancer. The rectal and intestinal cancers of young adults seem referable to other and uncontrollable factors.

Mammary cancer has appeared to be far beyond the reach of effective prevention. Chronic mastitis is known to be the main predisposing condition but so many cases of cancer arise without pronounced chronic mastitis and so many others arise in very early stages of mastitis that this theory alone has been inadequate to explain the frequent incidence of cancer. I believe, however, that mammary cancer practically never arises in a previously normal breast, but always in an organ altered by involution or inflammation. Many cancers arise from the sweat glands of the breast and here the causation is probably somewhat different from that of the common duct cancer. The sweat gland cancers usually appear near the axilla or near the skin and they are particularly frequent in subjects with oily skins and marked development of the sweat glands of the body.

Many observers have pointed out the prominence of stagnation of secretion in the cancerous breast, and Keynes has emphasized the part played by stagnation in chronic mastitis. Cheatle also has emphasized the importance of chronic irritation by retained secretion in the development of cysts and periductal fibrosis in chronic mastitis.

From the dissection of many cancerous breasts I have long been impressed by the evidence of stagnation in the ducts leading from the cancerous area, but it must be admitted that in many breasts, especially atrophic organs, the gross evidence of stagnation has not been clear. Yet in the earliest case of breast cancer that I have seen, 2 mm. in diameter in a girl of 21, the infiltrating fully developed cancer surrounded a single duct distended by secretion.

This entire question has been greatly illuminated by Bagg, who has produced mammary cancer in mice by withdrawing the young at birth and causing stagnation of milk in the ducts and acini. In a strain of mice found for many years to have a low natural incidence of cancer, he produced cancer in 85 per cent of the animals by breeding them rapidly, and withdrawing the young at birth. The tumors developed at a very early age, after the third or fourth litter. They appeared suddenly at one or more points in the system of ducts, recurred after removal, and killed by metastasis. Ligation of the ducts along one side of the animals was followed by cancers in the breasts of that side but not in the nursed side. This contribution is the first experimental production of a major form of cancer by a method which probably duplicates that occurring naturally in human beings. Overnutrition and excessive functional stimulus of both breast and ovaries probably occupy the stage with stagnation in these experiments, but there can be little doubt that stagnation is the prime factor.

Adair has pursued the factor of stagnation in the human breast as a cause of cancer. In 200 mammary cancer subjects taken at random only 8 per cent gave a history of approximately normal lactation. In several cases cancer appeared in a breast which for some reason was not nursed, while the other breast escaped. In many cases retracted or inflamed nipples were the cause of failure to nurse.

An astonishing amount of inspissated or puriform material can be drawn from many cancerous breasts by the breast-pump. Extending the observations to chronic mastitis, Adair finds that most breasts with chronic mastitis yield considerable, or large, amounts of secretion, often inspissated, upon the withdrawal of which, under massage and heat, the indurated nodules and cysts often completely disappear.

We have thus clinical, anatomical, and experimental data indicating that stagnation of secretions is a prime factor in the causation of chronic mastitis and mammary cancer, and a basis is thus laid for the hygiene of the breast and the prevention of mammary cancer.

In what form this information should be given to the public is a matter for cautious consideration. The subject has many ramifications. The following suggestions seem to me conservative. The breast does not always take care of itself but must often be taken care of by patient and physician, instituting a systematic hygiene of this organ. Young women with a tendency to chronic mastitis should be treated with the object of draining the breast of retained secretions. The practice of early and abrupt weaning of infants should be scrutinized from the point of view of its probable relation to mammary cancer. Congenital or acquired inflammatory conditions of the nipple which interfere with drainage and nursing should be corrected. The element of stagnation should be more prominently considered in future studies of the causation and course of chronic mastitis and mammary cancer.

DIET AND CANCER

The semimedical literature of the day abounds in advice for the avoidance of cancer by dietary and hygienic measures. One of the largest sellers among recent books laid the whole blame for cancer upon constipation. The public should be informed that there are no panaceas of this sort. No particular type of diet has any known influence on the incidence of cancer. On the other hand, one may preach without limit moderation in all things, sane and simple living, and minute attention to the general hygiene of the organs. The advantage of physical exercise may perhaps be recommended as tending against the development of cancer. Siversten and Dahlstrom have collected rather impressive evidence to show that muscular activity reduces the incidence of cancer.

The predominance of cancer at advanced ages, while a fact, has probably been overemphasized. The malignant tumors of children are numerous, very diverse, and rather inexpertly handled by the medical profession. Sarcomata and some embryonal cancers are very common in the first decade, and both cancer and sarcoma occur frequently in the second decade. When they do occur at these early ages, they are generally unsuspected, diagnosis and treatment are met by unusual delays, and prevention is never considered, all because youth is assumed to be immune to cancer.

I have thus reviewed the causes of some of the major forms of cancer with the main object of pointing out the fact that these exciting factors are generally of a simple nature, and such that their presence and mode of action may readily be understood by the public. Most of the material reviewed belongs to the old, well-attested knowledge of these diseases. Will the public receive information regarding the prevention of cancer? There is every indication that they will. The public consumes an enormous quantity of misinformation and near-facts regarding health culture and popular hygiene. I find a very general complaint among educated classes that sound information and advice are very difficult to secure. The atmosphere of indelicacy, once so pronounced, has largely disappeared from the discussion of cancer. The results of the campaign for the early diagnosis of cancer show that the public will listen and heed, if plainly addressed. They are bringing their early or supposed cancers to the doctor, although deterred by the fear of an evil pronouncement. It is sound psychology to suppose that they will grasp more eagerly at knowledge that may prevent the onset of a dread disease. Yet I fear too much should not be expected from any effort, however extended, to acquaint the public with these facts and to get them to act upon them. It requires more than average intelligence to accept and act upon advice which entails somewhat minute attention to one's organs. It also requires time and some means. Thus, when the means of prevention of cancer become widely known, cancer may become the eliminator of the unwary, the unintelligent, and the unfit.

However much or little cancer prevention may accomplish, it appears more more and more evident that early diagnosis alone is not capable of accomplishing the desired reduction in the death rate. Every experienced observer knows that the patient coming with an early diagnosis all too often fails completely of a cure. The list of cancers incurable from their first recognizable beginnings is a long one. The experience of patients accomplishing a cure of early cancer is generally a severe one, while the fate of the failures is passed over in silence. The public know these facts and therefore any plan of squarely meeting the problem of cancer control must eventually lean heavily upon cancer prevention.

Finally I think it should be frankly recognized in all public propaganda that the intelligent use of all present knowledge of prevention, early diagnosis and modern treatment, will still leave cancer the greatest of all the natural hazards in the adventure of living. The causes and conditions of benign or malignant tumors are almost innumerable. Who can seriously doubt that this group of diseases will for many decades, perhaps for centuries, take its heavy toll?

If these considerations are at all sound, then the effective organization of cancer research and education, in all their phases, becomes one of the first responsibilities of modern society.

REFERENCES

Berencsy and Wolff. Ztschr. f. Krebsforsch, 1923, xxi, 109.
Siversten and Dahlstrom. J. Cancer Res., 1921, vi, 365.

DISCUSSION

Mr. W. Sampson Handley, London: Dr. Ewing's paper deserves more attention than can be given to it in one hearing, and so I can make only a few disconnected remarks. He asked me to be severe in my criticism and, indeed, said in effect to me, like Balak to Balaam, "Curse me this paper." But I cannot conscientiously do so, for I agree with all its main conclusions.

I think Dr. Ewing might have emphasized the dangers of moles more specifically; there is no doubt but that one of these little dark spots does occasionally become a malignant tumor and often because it has been touched up with a caustic. People should know that if their moles enlarge or bleed or are subjected to constant irritation, then it is best to remove them. There are two methods of dealing with a mole; leave it alone or completely excise it: the fatal thing is to irritate it.

Dr. Ewing deprecated the factor of heredity in human cancer; I believe it is of minor importance. It has been enormously increased in Maud Slye's experiments upon the mouse, but her results cannot be applied to human conditions.

As to the question if cancer is due to an infective organism, my tentative acceptance of Gye's work has been shaken by Murphy's experiments at the Rockefeller Institute, and I am now inclined to return to my former belief that cancer represents a cell atavism. It is not surprising that the community cell sometimes feels the call of the past when it was free, independent, and single, happy in following its own inclination.

Ewing raises the question of mouth cancer and the importance of bad teeth in relation to it. The factor which seems to me most important is pyorrhœa or periodontitis. I do not know if you are acquainted with the work of Steadman who examined 200 cases of mouth cancer, assigning marks to each as follows: 4, if they had severe pyorrhœa; 3, if they were moderately bad; 2, if they were slightly infected; and 1, if the mouth was quite clean. The 200 cases received 93.5 per cent of the highest possible marks. Then he examined by the same system a number of control persons who had no cancer, as to whether they had pyorrhœa, and that group received only 50 per cent of the highest mark. It seems probable that periodontitis is a cause not only of growths in the mouth but of those lower in the alimentary canal, in the stomach or the intestine.

In regard to syphilis there is one hopeful consideration for the future. The result on cancer figures that will follow the antivenereal campaign undertaken in various countries cannot appear before 20 or 30 years, so we may look forward to some reduction in the cancer mortality about that time, though the reduction is not likely to be a great one.

Since coming here I have had a letter from a New York surgeon reminding me that there is a certain form of cancer which never occurs in Jewish men, and he connects this fact with the ritual operation performed upon all Jewish male infants. There seems no doubt that this form of cancer is absent among Jews, and prevention of it among other races may follow if a simple modification of this proceeding becomes a routine practice for all male children. It would also be defensible on grounds of ordinary hygiene as well, and for other reasons which I cannot now enter into.

As to mammary cancer I think the work of Dr. Bagg is very important and his hospital is to be congratulated on such a good piece of work. It will be interesting to see if Adair's new method in the treatment of chronic mastitis will be more effective than the former methods of treatment.

I was struck by the observation that physical exercise is a preventive of cancer, because this falls into line with what has been in my mind for some years. I believe local chronic lymphatic obstruction is an important predisposing cause of cancer. It overnourishes the cells and not infrequently poisons them by the accumulation of their own waste products. The most striking instance I ever saw was in a woman with elephantiasis of one leg. She applied an irritant to the leg in the form of a course of electric light baths and within a few months developed dozens of epitheliomata over the leg.

It is a well known fact that exercise is a promoter of the lymphatic circulation. In a classical experiment Starling introduced a minute metal tube into one of the main lymphatics of a limb. So long as the limb was at rest no lymph flowed, but when the muscles of the limb were excited to contract a copious flow of lymph took place. The fluid which bathes our tissues requires to be constantly changed, just as does the water in which cut flowers are placed, and this can be attained only by regular exercise. The rising generation prefers to ride rather than to walk, and it is quite possible that the Ford car is not so cheap as it appears and that part of its price is some portion of the present increase of cancer.

Prof. H. T. Deelman, Groningen, Holland: My thoughts after hearing this interesting paper are going in two directions. In the first place, this paper is for me like the confession of a man who really knows something about cancer and who at the same time always has in mind that we know only a little bit of it.

In the second place, I have remarked two phrases: first, it appears more and more evident that early diagnosis alone is not capable of giving us the desired reduction of the death rate; and, second, the list of cancers, incurable from their first recognizable beginnings, is a long one.

These two phrases, to which I quite agree, bring to my mind the great difficulties awaiting anyone who is to do any remarkable work in cancer control. Early diagnosis is of the greatest significance in making the patient healthy again; but, on the other hand, not all the cases who come as soon as possible can be cured. And so we agree that while very near to the winning of lives on the one hand, we illustrate very clearly in other cases the defects of medical knowledge which cannot but awaken the distrust of the people in medical science. It seems to me that it will be a question of the psychology of a nation, which way in cancer control we shall choose.

I will try to explain this in a few words. In one part of my country, especially the northern part, there is a population with precise habits, with a predisposition for exact sciences, and who avail themselves readily of medical assistance offered to them. In this part of the country it would be quite impossible to put on every wall of every home a paper containing a warning to consult a physician as soon as possible after the development of any disease symptom. For one thing, it would probably be quite useless, and then, too, it would give in a large percentage of cases false hope, in which I am in agreement with Dr. Ewing.

But there is also another part of my country—especially the southern part—where the inhabitants are more careless and have a more superficial manner of living. Here they have frequently, also, a somewhat fatalistic tendency and are very much inclined to place faith in quacks and marvellous cures, like the natives in our tropical colonies. These people have, as a rule, no great respect for the scientific physician, although they will give him a friendly reception. Perhaps in those countries a warning to go for advice as soon as possible will produce good results, because the cure of any case of cancer will make a deep impression, and will give an opportunity for the medical man to come into closer contact with them.

If I have understood Dr. Ewing's paper correctly, he states that if people live under circumstances in which their chemical irritations are as few as possible, cancer will decrease. At the moment we have not the scientific proof that he is right, but even if he is not right, then it may be certain that under the conditions of living that Dr. Ewing sees in the future a great deal of sanity will obtain. It is clear that all these propositions for the prevention of cancer will at the same time bring an increase of health and enjoyment of life.

I have said my thoughts were going in two directions, but I should have said three. For in the third place, my dear Dr. Ewing, my thoughts are going to you, to the man who has spoken to us and to the work he has done. In my country American books are very few; perhaps because they are very expensive, but all of us who have to do with tumors generally and cancers especially, are asking all the time, "What says James Ewing on the question?"

Dr. Archibald Leitch, London: When I was a schoolboy I remember reading that one of our statesmen, Joseph Chamberlain, came to this country and while here was surrounded by a bevy of policemen, and the newspapers at home, commenting on it, said that his reputation must have preceded him. I have been told by candid friends that my reputation is that of being quarrelsome, but I am really very peaceful, for, like most Scots, I am always anxious to fight for the sake of peace. It would of course give me great joy to differ from Dr. Ewing if he ever said anything to which I do not agree, but I cannot. I wish to take this opportunity of paying publicly my great respects to James Ewing. His textbook on neoplastic diseases is regarded in our laboratories with the respect we pay to a family Bible. I wish to say also that we have been very much impressed with the excellent scientific work done in America, and in the effort to bring about the prevention of cancer I am sure the future rests safely in the hands of such men as Francis Carter Wood, James B. Murphy, and our distinguished and beloved friend James Ewing.

Prof. Claude Regaud, Paris: I am happy to express to Dr. Ewing my sincere felicitations upon his remarkable paper. He has spoken with great caution on the subject of general causes predisposing to cancer. An hereditary predisposition of organs and tissues—a predisposition upon which Miss Slye's experimental researches have thrown a brilliant light—seems to me incontestable. There are, no doubt, general predisposing causes independent of heredity, but they are still very obscure, and therefore very difficult to combat. There is one fact to which I may call attention that shows that they are not of very great importance.

Surgery and radiological methods permanently cure a constantly increasing number of patients, by purely local procedures. These procedures are utterly incapable of overcoming general predisposing causes. If these causes were of great importance, we should see new cancers appear among our patients who have been cured—cancers succeeding the first ones and different from them.

Now, this is not the case. When a patient is cured of a cancer by surgery or radiations, a second cancer very rarely occurs. As against 100 cases of cancer occurring in various localizations, which we have been curing over a period of more than 5 years by radiological methods at the Radium Institute of Paris, we have seen a second cancer, different from the first, appear only two or three times.

It is true that the life of a human being is long and that a 5-year period of observation is short. It is nevertheless remarkable that general predisposing causes are incapable of producing a new cancer several years after the cure of the first one. This is very encouraging for our present-day therapeutic methods.

Dr. Ewing has pointed out the inadequacy of our knowledge with regard to the etiology of cancer. He is right in saying that it is more to laboratory researches than to statistics and clinical observations that we must look for further progress. This point cannot be too strongly emphasized. Pathologic histology in particular, to which we owe our first accurate knowledge of cancers, and of which Dr. Ewing is one of the most illustrious representatives in America, has not spoken its last word. Not only does it lie at the bottom of all classifications that we make, and play a preponderant rôle in diagnosis, but it has also become the indispensable guide of all who devote themselves to the difficult problem of the biological action of radiations.

In the control of cancer, the preponderating part lies with the work of the laboratories, particularly those of pathologic and experimental histology. As Dr. Ewing has rightly said at the end of his paper, those who are to take care of the campaign against cancer must not forget this.

Dr. George A. Soper, New York City: It is with much pleasure that I take this opportunity to express my appreciation of what is perhaps the most informative and wisest paper on the prevention of cancer that has thus far appeared in any language. Those who have enjoyed it and been instructed by it and who may wish that others might have this privilege may be sure that Dr. Ewing's address will be printed and have a wide circulation. I will see to that.

For some years I have been giving considerable attention to the possibilities of preventing cancers, with special reference to the parts of the body where they occur, and I have reached the opinion that, all in all, perhaps more cases can be prevented than cured.

One of the difficulties in the way of either prevention or cure lies in the manner in which human beings act toward danger. There is no such impelling motive to do something radical, or to refrain from doing it, when our health is threatened as when we are actually confronted by accident, or experience an attack of painful disease. When the danger is ahead of us, we always think we may be able to escape in some way or other. Consequently, people do not ordinarily take good care of their health until they begin to lose it; and then it is often too late. And so with cancer.

The hygiene of the mouth is, as Professor Ewing has said, a desirable procedure as a preventive of cancers, but it is difficult to get people to keep their teeth in good condition and their mouths clean, when they know the risk of dying of cancer as a penalty for not doing so is so small.

Perhaps the attention which should be given to pigmented moles affords the best illustration of preventive work such as everyone can understand, and concerning which the danger is fairly obvious. Unless people are frightened into doing so, they will seldom have moles removed before they are troubled by them, and this is true even when the moles are of the most dangerous type and are in locations which subject them to continual irritation.

I have sometimes thought that it was best to urge hygienic measures on other grounds than because they afforded means of escaping serious specific consequences. I have advocated that cleanness should be urged for the sake of cleanness quite as much as because it means freedom from definitely harmful things. I believe that people respond to arguments making for greater cleanness and order about their persons, as about their homes, when they can not be moved because of any particular danger that is pointed out to them.

If I am right about this matter, we have here an opportunity to place a strong force behind Professor Ewing's argument for the prevention of cancer.

Dr. Joseph C. Bloodgood, Baltimore: I have been put in a very difficult position, but I think that some of the things Dr. Ewing said will bear repetition from a little different standpoint.

We have discovered that with a certain message to the people we get a certain reaction, and on that at the present moment depends the campaign of preventive medicine. We can safely say to the medical profession today, that as you sow the message of truth in regard to preventive medicine, so will you reap. Thus it is a question of getting this message to a larger number of people.

There are two things at least that we wish to get to the people of this country. One is in regard to the message on preventive medicine and the other is in regard to research. Tonight, if I can in a few words, I want to give a message regarding the education of the people, not through the lecture, but through the conversational message. The conversational method is open to every person in the world today and by it he can protect himself better than in any other way from preventable disease. The way to employ it is by the selection of a medical adviser; not only one in whom you have confidence but one in whom you can have confidence. I feel that the greatest of propagandas is the advice to get a medical adviser before you are sick, and to have periodic examinations. Let me give you some data in proof of this.

A colleague of mine whose name was Bolgiano, a graduate of Johns Hopkins and the University of Pennsylvania, practiced in Baltimore when I came there in 1893, and I knew him very well. Even then we knew the importance of operating for appendicitis in the early stage but we could not get any patients. I told him that if he would send for me when he had a patient with stomach-ache I would come for nothing. I was then receiving a salary of $500 a year. Subsequently, I saw many of Bolgiano's patients. He was the type of practitioner who had the affection and confidence of his families so that the moment any one of them had the least discomfort they saw him that day. Bolgiano died ten years ago and on his card index were 400 cases of appendicitis that I had seen with him, in the majority of which I had operated, and I would be glad to have a committee visit my clinic and see the records of these cases for they will find that not a case of Dr. Bolgiano's with appendicitis died. I can give you other figures.

If you will select your medical adviser before you are sick and will submit to protective examinations, during conversations you will learn you can protect your children from diphtheria as a result of research work. And yet today the percentage of children in this country protected from diphtheria is infinitesimal, compared to the number that should be protected, in spite of all the publications on the subject.

Dr. Soper has asked me to repeat a few figures I gave him this morning, but figures are not interesting and you will not remember them. But let me give you some idea of what happens. In the first place, we have found our message brings patients because we have created in their minds a little fear.

Whether ultimately that will be the method, at the present time the people who come to us in the curable stage of disease, come because of a little fear. In every history we record we ask, "Why did you come? How long after you felt this did you consult your physician?" The physicians on our card index do not delay. The delay in reaching our clinic in Baltimore is on the part of the public and not the physician. We find that they come because of that little element of fear, so we can safely make the statement that fear in the beginning of disease will help you. The fact that an individual consults his physician because of fear of disease marks one of the greatest triumphs of the art of medicine. Relieve that fear whether or not you can relieve the disease, but in the majority of cases you can also relieve the disease. I am anxious to leave this thought with you. When you have done this, in 60 per cent of cases, 60 per cent who have trouble with breast, with mouth, with rectum, with skin,—over 60 per cent with indigestion have stomach cancer,—that 60 per cent may not be cured of cancer, but if they have any local irritation that precedes cancer we have the opportunity for its prevention, which Dr. Ewing has shown you this evening. In that 60 per cent who have a little fear as a result of a campaign, we generally find something that needs correction, such as sugar in the urine, a tonsillar infection, an abscessed tooth, or the like, so they can be protected.

Dr. Erwin F. Smith, Washington, D. C.: It is with some hesitation that I rise to speak—first, because I am not a medical man, and second, because I am not a member of this Society. But there were one or two points on cancer prevention stressed last night by my good friend, Dr. Ewing, which seem to need attention, and in addition one thing on cancer control that has not been mentioned by any of the speakers in this congress—and that thing is the question of the existence of so-called cancer houses, streets, and districts. The reason this subject has not been alluded to is that none of those who have spoken believe malignant tumors to be due to parasites, yet no one has established that human malignant tumors are *not* so caused, and until that time comes I think cancer control societies might very well warn people of the possible danger of allowing vermin about houses. By this I mean rats, mice, cockroaches, waterbugs, bedbugs, fleas, flies, meal-worms, etc. The number of cancers of the lower animals now known to be closely associated with parasitic worms—and their number is increasing every year—renders all such worms suspicious and also the various kinds of vermin which act as carriers of these worms. Dirty raw foods should also be very carefully avoided until it is established that cancers in man are not of parasitic origin.

Dr. Ewing in his otherwise admirable address scouted the idea that cancers can be due to parasites and minimized the influence of heredity. Personally I believe that we shall eventually find that malignant human tumors are of parasitic origin. As a biologist, I also believe that the laws of heredity hold from the lowest to the highest forms of life and that man is no exception. Now, if the tendency of cancer can be bred *into* or *out of* experimental animals, and we have abundant evidence that this can be done, it seems to me logical to conclude that the same laws hold good for men. But, of course, other factors than heredity enter into the problem. I do not believe at all with Sir James Paget, as cited by Sir John Bland-Sutton, that if we lived long enough all of us would die of cancer. Some persons would never die of cancer, not even if they lived to be as old as Methuselah. It takes both heredity and environment to produce a cancer.

Dr. H. R. Charlton, Bronxville, N. Y.: May I have the honor of suggesting a scheme aimed to prevent carcinoma of the uterine cervix, a malignancy third among human carcinomata, and, according to Schereschewsky, increasing year by year? Its incidence may readily be appreciated if each one of you, calling to mind any city of approximately 40,000 people contiguous to your home, will let his mind dwell on the probable reaction of his state, should all the wives and mothers of that city be wiped out within the space of one year.

Consider further the national consternation which would ensue should this tragedy be repeated annually in similar cities of separated states. Carry this mortality to Europe, to centers of comparable size, and I venture to state that an international wave of fear, horror, and defence would speedily develop.

Scattered about the United States a like number of women perish yearly, 10,000 of them of cervical carcinoma. To each of these may be allotted a year of morbidity: 10,000 years of suffering for women in each single year of our national life. Allowing 4 members to the family of each afflicted person, 40,000 persons in our country are continually under the shadow of approaching death. Within that year how much of lost productiveness and treasure!

Within the past three years at the Woman's Hospital in New York City, it has been my privilege to see approximately 150 previously unstudied cases of carcinoma of the cervix, and as one result of this clinical observation I am almost persuaded that no one of these cases would have occurred if the individual had previously been clean; hence I suspect that cervicitis was, in the majority of these cases, a precursor and possibly *the* precursor of malignant degeneration of this area.

Having talked to recent graduates and watched clinical assistants, having appreciated in out-patient departments the number of women suffering from cervicitis who have derived no benefit from such treatment as had previously been suggested to them, I am convinced that practitioners are insufficiently acquainted with the symptoms, pathology, and treatment of cervicitis.

Is there anything to be done?

I believe that the problem and solution of cervical carcinoma is locked up with the pathology and a proper therapy of the inflamed cervix, and the suggestion I have to offer is the formation of a cervical cancer committee within this organization to start an educational campaign for doctors through all medical journals, in pamphlets, and in county societies, for the recognition and cure of cervicitis, whereby men are to be persuaded that they are detecting and treating not a catarrh of the cervical canal, not an erosion, but destroying seed from which cases of carcinoma may develop.

I suggest the introduction into the already crowded curriculum of medical schools of intensive courses in the diagnosis and treatment of cervical disease, and then a vigorous campaign among the women of this country concerning "pelvic prophylaxis," which term I would make as familiar as "Listerine" or "Ivory soap."

If Dr. Ewing and Dr. Wood believe my conception of the relation between cervicitis and malignant degeneration of this structure to be sound; if Dr. Taylor and Dr. Graves will admit that students in medical schools are insufficiently instructed in disease of this organ; if Sir John Bland-Sutton and Dr. Mayo are persuaded that my conception may contain a truth, will they not add the prestige of their names to support the suggestion initiating such a campaign?

Dr. D. Crosby Greene, Boston: I have been commissioned by the American Laryngological Association, whose President appointed Dr. Fielding Lewis and myself to attend and participate in the proceedings of this Symposium, to bring before the attention of this gathering, if possible, two points of view that are important in the control of the early stages of cancer. One of the points was that attention be paid to the condition of the fauces; chronic faucial trouble may be present over a year without producing any other symptoms. These cases, if attended to early, can be checked. In cases of intrinsic carcinoma of the larynx, the point of importance is the early examination of the larynx in all phases; for in our clinics we see these cases continually at the stage where nothing can be done.

The other point has to do with carcinoma of the œsophagus. That is a most hopeless situation. If there is to be any help, it must be afforded in the early stage. Dr. Jackson has pointed out that difficulty in swallowing is a late symptom. The early disturbances of a vague nature are often present before actual obstruction is encountered. Therefore he urges that in every case of obstructed swallowing early X-ray examination be resorted to. These are two points that our Association would like to have presented to this Society.

Prof. Henri Hartmann, Paris: I have made some observations on the question: Is cancer contagious?

We must acknowledge that facts in favor of contagion seem to be very rare. Perhaps the scarcity of such observations is only the result of the difficulty in establishing them. It is very easy to prove contagion in acute diseases such as measles, but it is different with chronic diseases. The contagiousness of tuberculosis has been denied for a long time and yet the lesions seem to evolve more rapidly than those of cancer.

The existence of cancer houses is far from being proved. In spite of the difficulties in knowing, in a great city like Paris, the successive tenants of a flat, we have been able to note a few cases in favor of their existence. In the same flat we have seen a first tenant dying of rectal cancer; the second tenant died also of rectal cancer. In another one, where a patient died with a gastric cancer, we have operated upon the wife of the following tenant for cancer of the face; then the husband of the latter died from abdominal cancer. In a third flat a patient died from generalization of cancer of the breast; we have operated upon the following tenant who had a cancer of the rectum.

Contagion between husband and wife has been rarely noted; perhaps this comes simply from the fact that it has not been looked for. Since I have looked for it I have, in a very short time, noticed some cases. We may add to the cases noted with regard to cancer houses, the following: (1) Wife, cancer of the face; husband deceased the previous year from cancer of throat. (2) Wife, cancer of the womb; husband operated upon two years before for cancer of penis. (3) Husband colostomized for rectal cancer; wife two years later had cancer of the breast. (4) Husband colostomized for rectal cancer; at the same time wife had breast cancer. (5) Husband and wife at the same time had rectal cancer. (6) Wife operated on for breast cancer, which recurred four years later; during this time husband died from cancer of the prostate. (7) Wife, rectal cancer; husband, osteosarcoma of femur at the same time. (8) Husband, mammary cancer; wife had died nine months before from mammary cancer which had been operated on two years previously, with recurrence.

These few observations are not numerous enough to permit definite conclusions, but are yet sufficient to attract attention.

Dr. George A. Soper, New York City: The remarks made by some of those who have discussed Professor Ewing's paper lead me to say that we should make a clear distinction between our scientific theories and the well established facts and practical working opinions which ought to be employed in the control of cancer.

We are not justified in setting aside the good things we know for what seems to be better but is really based upon hypotheses which have no sound foundation.

I could give illustrations of my meaning, taken from nearly every field of work against cancer. For example, we do not actually know whether cancer is or is not communicable. For practical purposes we ought to regard it as not infectious. It would be a great mistake to advocate measures for the prevention of infection on the assumption that the disease is communicated from person to person by means of parasites. Perhaps parasites do produce some forms of cancer, but until we have better proof that this is generally the case, it would be a mistake to insist on disinfection or isolation. It would not be merely a mistake—such insistence would entail serious consequences. The patient and the patient's relatives and friends would be seriously discommoded, and the quacks would be greatly encouraged. And so, for practical purposes, we ought to say certain things about cancer which we may not be willing to say so positively in discussing the scientific possibilities among ourselves.

Sir John Bland-Sutton, London: I hope it will not go forth as the opinion of this Symposium that belief in a cancer parasite is no longer tenable. I firmly believe that cancers are due to microparasites. The history of our knowledge of cancer is important in relation to this matter. Virchow called his classical book *Tumor Diseases.* Professor Ewing calls his book *Neoplastic Diseases*, which is merely a paraphrase of Virchow's title.

Bacteriology was non-existent when Virchow's book was written. Tumors were classified mainly by their physical and structural characters. When the compound microscope was used in histologic studies and aided by histologic chemistry in the form of staining reagents, many morbid growths from the ill-assorted group of tumor diseases were found to be due to microbes—granulomata, tuberculomata, syphilomata, actinomycotic masses and the like. Every increase in the power of the microscope and every improvement in staining methods evicts from morbid growths some which mimic sarcomata and cancers.

One of the technical difficulties in detecting the microparasitic cause of cancer is the need of a reagent which will stain living protoplasm.

Dr. Willy Meyer, New York City: We heard Dr. Ewing say last night that there was still a wide difference of opinion on the question as to whether cancer was of parasitic origin and that this important question had to be settled first, before real progress in the cancer problem could be made. This is also my opinion.

I shall never forget the day when the American Surgical Association met in Washington and some of the Fellows, myself included, went to the laboratory of Dr. Erwin Smith and saw what he had discovered in plants. After having seen his remarkable results, a number of us thought that at last the way to proving that cancer in man was of bacterial or parasitic origin had been shown. We were enthusiastic, and I was one of those particularly impressed. That was, I think, in 1909 or 1910.

Two years later I talked about this same question with Professor Aschoff of Freiburg, when he visited America. I asked him: "What do you think of the parasitic origin of human cancer?" He replied: "Meyer, if you reach Methuselah's age, you will never see the cancer parasite found." These words I can never forget.

The surgeons all over the world naturally take great interest in the subject of cancer, and many have expressed their views about it, for we have so many times witnessed the physical and mental misery of its victims, not forgetting that of their families. For the last seven years I have delved into the literature of cancer, with regard to its genesis. It is a terrific task.

Many times it has come into my mind that not only should we have an American Association for Cancer Research, but also an American, a French, a British, a German—nay, an International—Association for the Research of Cancer Literature (of the present as well as of the past).

Parasites represent one group of the many cancer-inciting factors which, after a precancerous state, often call forth the same end-result in the human body, namely cell death. To my mind it is the dead cell and its chemical decomposition products which, by multiplication to any extent, seem to lie at the bottom of the cancer genesis.

Certainly, what seems necessary at the present moment is to fight out definitely among ourselves and those interested in the cancer problem the all-important question of the so-called parasitic theory of cancer; to try to come to a mutual understanding, and then put the question at rest, once and forever. Then the laboratories of the many cancer research institutes will have a firm foundation on which they can build, and no more time nor money will be wasted in settling a question that has disturbed and retarded the progress of the real solution of the cancer problem for untold years.

PROF. F. BLUMENTHAL, Berlin: The questions whether cancer is caused by parasites or by contagion are not the same. Nobody disputes the statement that parasites may be the exciting agents in cancer; witness, for example, the spiroptera cancer, bilharzia cancer, and the development of cancer after syphilis and tuberculosis. But these are exceptional or special cases. In all these the parasite is the exciting cause of the inflammation *only*, of the precancerous condition, out of which the cancer then develops on its own account.

The autonomous growth of the cancer cells has the value of a fixed law; for this growth the exciting agent is no longer necessary in these cases. The law therefore holds good here. How this is brought about in the case of the bacilli of the neoplastic group will be shown by me in discussing Dr. Roussy's paper.

The question whether cancer is infectious or not is quite unsettled; in the ordinary sense, it certainly is not. But one may reflect upon the long period of incubation in X-ray cancer and experimental cancer in animals. In the former it is some 10 years after the burn before cancer develops. Where the time interval is so great it is hardly possible to establish whether cancer is due to contagion. Hence the possibility of contagion as a cause in the one or the other case is not excluded, but one must not assume an origin that is solely parasitic.

Chemical and physical irritations have been so certainly pointed out as etiological agents of cancer in human beings also, that their causative rôle may be considered as good as proved. But it has not yet been established whether the non-parasitic or the parasitic agents play the greater part in the production of human cancer.

DR. EWING (closing the discussion of his own paper): Opinions regarding the cause of cancer are diverse and are so firmly rooted that I fear none of us will see a final agreement on this question. One cannot but feel due respect for the conclusions of those who by a process of reasoning reach the view that cancer is caused by an unknown parasite, but somewhat less consideration may be due to those who adopt this view as the result of habit. It would be ungraceful to inquire how far human psychology rather than critical reasoning enters into the support of the parasitic theory.

The most fundamental objection to the parasitic hypothesis lies in the biological position of neoplastic processes. I feel that no one can make a thorough study of the causation, as we know it, the morphology, and the clinical course of malignant tumors, without reaching the conclusion that under the term "cancer" are gathered a great many very different diseases, which are related only by the fact that the underlying process is unrestrained growth of tissue cells. So also there are many inflammatory diseases, in which, however, the reaction to injury is organized.

It seems to me that there are about as many specific diseases in the group of malignant tumors as among the inflammatory diseases, and I can see no more reason for assuming a single cause for the one group than for the other. This view has gained much support from the increasing list of cancers known to be caused by specific non-parasitic agents, such as tar cancer, X-ray cancer, betel-nut cancer, Kangri cancer. The many tumors of lower animals caused by nematode worms must be referred to the irritation of specific chemical agents which are secreted by the worms and not to micro-organisms.

If one chooses to adopt the theory of a universal cancer parasite, he must assume in addition all that that implies. He must assume that all tumors are one and the same disease, which in the present state of knowledge seems quite untenable. I note that Dr. Blumenthal is so well grounded in pathology that he is not prepared to accept a universal cancer parasite, but seems to hold that only certain tumors are caused by micro-organisms. It seems possible that certain micro-organisms may show a peculiar capacity to induce neoplastic proliferation of cells. The tubercle bacillus has this property to some extent. Yet the exponents of the real parasitic theory demand a universal cancer parasite, of the existence of which we have no tangible evidence.

The objections to the present vogue of the parasitic theory are numerous and serious. A large proportion of the medical profession and the general public have adopted this theory, and are eagerly awaiting the discovery of the parasite. Hence both become a ready prey to charlatans, who claim to have discovered the parasite and to have for sale a cancer cure based upon it. When distinguished physicians and surgeons announce that the cause of cancer, namely, the parasite, remains undiscovered, they induce people to believe that there is a single cause, and they distract attention from those very simple forms of chronic irritation which are well known to be the effective exciting factors in cancer. Finally the theory of a cancer parasite has dominated cancer research in many important circles, and for many decades, and history shows that this study has been rather emotional, often incompetent, and generally unprofitable.

With so many contending theories regarding the causation of cancer we must proceed in our educational program like a ship without a rudder. How can the public choose between the theories of parasitic origin, hereditary transmission, and chronic irritation, when medical authorities vigorously proclaim each of these views? While complete agreement cannot at present be reached in such a very complex subject, it seems desirable that some statement should be prepared embodying the most judicial consideration of all the known facts, which may be given to the public and urged upon the medical profession. Otherwise every man, woman, and child will continue to enjoy his own theory of the origin of cancer and the present chaos will continue.

HOW WE SHOULD REGARD THE NEW THEORIES OF THE ORIGIN OF CANCER

By Professor GUSTAVE ROUSSY, Paris, France
Professor, Faculty of Medicine, University of Paris; Director, Institute for Research and Treatment of Cancer, at Villejuif, for Suburban Paris

SINCE the memorable discoveries of Pasteur, scientists have been divided into two quite different groups according to their conception of the origin of cancer, some believing it to be due to intrinsic causes, hereditary or acquired, of cellular evolution, others holding an exogenous, living, specific agent responsible.

The infectious theory (bacterial or parasitic) has for a number of years enjoyed a new lease of life, thanks to the discovery by Peyton Rous of a curious tumor in chickens which is reproduced in series by inoculation of the dried filtrate. Erwin Smith later demonstrated the presence of bacterium tumefaciens in some varieties of plant tumor behaving like cancer. Finally, the conception of filtrable viruses furnished proponents of the infectious theory with a series of new arguments.

The cellular (or intrinsic) theory, on the other hand, became rejuvenated and modified by the method of tissue culture *in vitro* developed by Alexis Carrel. Moreover, the progress of biochemistry, and especially of physical chemistry, brought to bear on cytobiology (the biology of the cell) new light which permitted a more searching analysis of cell life. The study of the various modern hypotheses with regard to the origin of cancer is not only of great academic interest but it has also practical and social values. Indeed, the problem of the origin of cancer is bound up with the question of its contagious and hereditary transmission. If we assume the infectious character of cancer, we at once imply that it is a contagious disease, which requires for its prevention all prophylactic measures employed against the other communicable diseases. If, on the contrary, we believe that cancer is of cellular origin and is produced by an aberrant character acquired during embryonic life, we imply that we are dealing with an inherited disease against which all measures of prevention are powerless.

Finally, if we hold that cancer is a character of cell life acquired during the evolution of the cell, resulting, for example, from a prolonged chronic irritation, one may understand what practical deductions may be drawn from this conception, namely, the prevention of all irritations, from whatever source derived.

A series of recent contributions which have served to renew the fight between the adherents of the infectious and the cellular theories has led modern writers to view the whole problem from new points of view. It appears, indeed, that while the infectious and cellular theories continue to exist, they are now less plainly opposed than heretofore, since the majority of the partisans of the infectious theory now admit that in addition to a living specific agent, a specific chemical factor must also exist.

I will take up a more detailed consideration of these several theories.

I. THE RECENT BACTERIAL THEORIES

Those who at present uphold the infectious theory make use of a method which consists of isolating a certain factor from a fragment of tumor or from the product of its grinding or filtration, attempting to cultivate this factor in a suitable medium, and, finally, trying to produce a new tumor by means of animal inoculation.

But these attempts meet with serious obstacles of a technical nature which render the results open to criticism; for example, the difficulty of obtaining a filtrate free from cellular elements, as well as the fact that it is nearly impossible to avoid sources of secondary infection.

Theory A. Cancer Is Caused by a Living Organism Exactly as Are Infectious Diseases

A large number of bacteria, parasites, or fungi have been described as the specific etiologic agent in the causation of cancer.

These researches have not withstood the test of time and have been largely forgotten. However, a few modern writers have recently been working again along this line. For instance, Nuzum claims to have isolated from human and mouse tumors a coccus occurring in pairs or chains and growing only under anaërobic conditions. Inoculation of this coccus into mice, dogs, and once into man has produced tumors. These results, however, are not worthy of very much consideration. Nuzum himself recognizes that the tumors so produced are difficult to identify and do not possess at all the histologic characteristics of real cancerous processes. It is also possible that in Nuzum's experiments the very difficult filtration required was far from perfect; this might follow from this author's statement that a subculture never gives a positive inoculation.

The same reservations must be made with regard to the work of Glover, Scott, and MacCormick.

Glover isolates from rat sarcoma as well as from human cancer an organism which he believes to be specific and which he cultivates in a special medium. This organism, really polymorphic, is bacillary in form and may show spore formation. Inoculated into animals (especially the chicken) it produces Rous' sarcoma. Inoculated by Scott into monkeys the organism was said to have produced epithelial tumors of the lip, tongue, and breast; finally, it produced a toxin, and the authors were able to prepare even an antitoxin and an agglutinating serum.

Unfortunately, confirmatory work has not yet been possible on account of the meager data furnished by the authors, but already there is reason to believe that Glover and Scott were led on a false trail, and especially that their results were falsified by errors of technique.

Similar researches have been pursued in Germany, at the Berlin Cancer Institute, by Blumenthal and his co-workers. Blumenthal seeks for the organism of cancer at the periphery of the tumor as in the case of bacterium tumefaciens, described by Erwin Smith in the cancer of plants. His method is to cause burns on the surface of the cancer by means of a lens which concentrates the sun's rays. In the serum of the vesicles so produced (the result of tumor lysis), polymorphic organisms are found which the writers believe to be specific for cancer and which, inoculated into animals, produce most frequently nodular reactions of the connective tissue type; in order to produce more typical tumors silica must be added. But Blumenthal himself is not very positive in regard to the real significance of the isolated bacilli, which he has named *neoplastic*. He wonders whether the organism in question is specific for the so-called "infectious" tumors, or if, on the other hand, its function is simply to act as a carrier for the specific, but invisible, virus. He also asks whether the initial cause of cancer might not be purely chemical, the parasite serving only to set up a reaction analogous to the process described by Erwin Smith in plant tumors.

Theory B. Cancer Is Due to the Combined Action of a Filtrable Virus and a Chemical Agent

There appeared last year in England a contribution which elicited great interest in the scientific world. Gye and Barnard developed an interesting hypothesis, but made the mistake of generalizing too much in regard to its significance. According to these authors, cancer is due, not to a visible organism, but to a filtrable virus or ultravirus, that is to say, one of those infinitely minute living organisms which pass through the finest filters and which are invisible by ordinary methods.

However, according to the hypothesis of these English writers, this ultravirus is not capable of producing cancer alone, it must be associated with another element, which is chemical in nature.

By combining the chemical factor of a chicken tumor with the ultravirus of any tumor (mouse, rat, or man), Gye produces without difficulty a sarcoma in the chicken. This writer believes, therefore, that the chemical factor is the specific agent peculiar to each type of tumor cells; that is to say, with the chemical factor of the chicken sarcoma only sarcoma may be produced in chickens. The ultravirus, on the other hand, is not specific, but is common to all malignant tumors. Finally, Barnard believes he has succeeded in demonstrating the virus of cancer, thanks to improvements in the lighting of the ultramicroscope, and to the use of ultraviolet rays for this purpose.

To summarize, Gye and Barnard have drawn the following conclusion from their series of experiments:

1. Every malignant tumor contains an ultramicroscopic virus or a group of viruses, which may be cultivated, demonstrated, and microphotographed; this virus is probably contained in the neoplastic cells.

2. This virus alone, purified and cleared of all accessory substances, is not capable of producing a tumor by animal inoculation. Injected in the tissues it causes no lesion.

3. When the virus is injected together with a culture of an extract of tumor, it produces a malignant tumor. This extract, therefore, contains a specific factor which renders the virus capable of attacking the normal cell and of transforming it into a cancer cell.

4. The virus is in no sense specific, since one may produce a tumor in an animal of one species with a virus taken from an animal of another species.

5. The specific or chemical factor, on the other hand, is strictly peculiar to the species of animal from which it is secured.

6. Hitherto, the specific factor has been found only in connective tissue tumors of the sarcoma type. It is particularly abundant and resistant in the Peyton Rous tumors, while in other tumors it exists in a small quantity and is very labile; in the latter case oxygen-free media must be employed in order to demonstrate it.

The work of these English writers immediately gave rise to numerous criticisms by Fibiger, Dustin, Blumenthal and Roussy, who were all struck by the opportunities for error which existed in the experiments of Gye and Barnard. Today, it is almost unanimously agreed that these authors made the mistake of generalizing in regard to the problem of cancer, and that the results, however interesting, require more solid confirmation. Apart from the possibility of technical errors which might have crept in, the English researches have hitherto dealt only with sarcoma, and, moreover, with a sarcoma of a particular type. Now sarcoma must be studied with caution, as its nature is still an unsolved problem; it is for this reason that all experiments hitherto made with sarcoma have resulted in failure.

The proof of the inoculability of cancer will be clear only when an epithelial tumor is produced in the same or a different species of animal by a medium altogether free from cellular elements.

To summarize the present position in regard to the infectious theory of cancer: It is clear that both early and recent workers have failed to prove the specificity of the organisms they have isolated. The most variable pathogenic agents have been demonstrated, these differing with each research worker, and as the tumors produced by inoculation are inflammatory pseudo-tumors, one is led to believe that we are dealing with organisms responsible for secondary infection.

II. THE CELLULAR THEORIES

Most of the researches along this line are based on the study of tissue culture, and upon the sub-culturing of tissue *in vitro* according to the method developed by Alexis Carrel.

These studies have furnished contributions of the greatest interest to the solution of the cancer problem, considerably enlarging the field of our investigations.

Theory A. Cancer Is Due to a Specific Principle, Elaborated by the Cell Itself

Carrel attempted to learn how a malignant cell differs from a normal cell of the same type, and what is the factor which gives the malignant cell its special properties. For these researches he used Rous' sarcoma, the spontaneous chicken sarcoma, or a chicken sarcoma set up by chemical action.

Carrel succeeded in isolating two types of cells; fibroblasts (which are the fixed cells of connective tissue) and macrophages (the mobile cells of the connective tissue or of the blood). He then showed that when the fibroblasts in pure culture are inoculated with the virus of the Peyton Rous chicken sarcoma, they resist infection, which proves that the aberrant element in sarcoma is not the fibroblast.

On the other hand, the macrophage constitutes the malignant element of the Rous sarcoma and also of the spindle cell sarcoma of chemical origin. It is well known that these essentially malignant cells do not possess much vitality; on the contrary, they are fragile and die rapidly. In dying they liberate certain bodies—the "trephones" of Carrel, which have the property of increasing the multiplication of the neighboring cells—and in this manner the malignant element of the Rous sarcoma, known as the virus, is propagated indefinitely.

According to Carrel, the virus is not a definite organism; it is produced only in the presence of cells and it depends directly on the quantity, the activity, and even the nature of these cells. Moreover, it is found only in contact with cellular elements, or rather it is produced by them.

In order to cause tumor formation, a number of conditions must be present:

1. A certain strength of the chemical substance.
2. Cells in a given condition.
3. A certain susceptibility of the organism.

While recognizing the interest inherent in these observations, which widen the horizon in the field of cancer causation, it seems timely to make certain reservations as to their general import.

For instance, one may ask whether it is proper to apply results furnished by the cultivation of tissue *in vitro* to phenomena which arise in the body, where the tissues live in the most intimate symbiosis. And the question arises, to what extent may researches like those of Carrel, which have dealt exclusively with a special type of tumor (chicken sarcoma), serve to elucidate the problem of cancer in general?

Theory B. Cancer Is Caused by an Abnormality of the Cellular Glycolysis

While cytobiologists pursue the study of cancer by means of tissue culture, biochemists approach the problem from a different angle, and, of course, reach conclusions very different from those of bacteriologists. Warburg, a German physiologist, has tried to show that cancer is simply the result of disordered metabolism of the cell.

Two phenomena are noted in normal cells, in so far as their content in carbohydrate and especially in glucose is concerned:

1. Glycolysis, which splits the glucose molecule and produces lactic acid.
2. Respiration, which, on the contrary, results in the building up of carbohydrates, one or two molecules of lactic acid disappearing for every molecule of oxygen consumed.

According to Warburg, these reactions are the key to the phenomena of living cell metabolism; they vary according to the activity of the cell, being particularly pronounced in tissues of active growth like the normal embryo or cancer. In the latter, however, something of special note occurs, in that the loss of the normal rhythm between respiration and glycolysis characterizes the metabolism of the cancer cell, the disturbance affecting cellular respiration. While variation in the glucose content of the cells is a very general phenomenon, and while there is a real synchronism between the elaboration and destruction of glucose in the normal state, that synchronism is destroyed in the cancer state. The respiration does not follow the loss in sugar. As to the cause of the phenomenon, Warburg believes that cancer originates in the absence of oxygen, and this is the foundation of his theory.

As all normal tissue possesses a double metabolic power (glycolysis and respiration), it must be assumed that the constituent cells have gradually become specialized, some in the phenomena of respiration, others in the phenomena of glycolysis. Should anything occur to deprive the tissue of oxygen, be the cause mechanical, inflammatory or other, the only cells which persist are those capable of glycolysis, and the survival of these cells is further favored by the death of neighboring cells.

Such is the new conception of cell cancer.

However interesting these observations may be *per se*, they serve only to bring one more element to the biochemical analysis of the cancer cell, without, however, throwing any light on the nature of the disturbance.

Without doubt, Warburg's observations have cleared up an important point in regard to the physiology of the cancer cell, in showing that it is no more a normal cell in its metabolism than in its morphology. However, it is difficult to follow Warburg in his hypothesis of the primary cause of cancer, which his experiments have not hitherto elucidated.

III. CONCLUSIONS

It appears from this rapid survey that the present trend of thought in regard to the cause of cancer is leaning more and more to the idea of an intrinsic disturbance of cell life. The mechanism of this disturbance can be analyzed, although its primary cause is still unknown. Probably its causes are multiple, as is shown by the experimental production of cancer in animals.

Recent work tends to strengthen the proof that cancer is not due to a living agent comparable to those responsible for the infectious diseases; nor does it appear to be due to a cytotropic virus. These considerations should lead us to believe that cancer is not a communicable disease, and this belief should be spread among physicians and the public.

It seems, on the other hand, that cancer is a disease of the cell, perhaps even of the cell nucleus, which results from an intrinsic physicochemical disturbance, perhaps due to a chemical factor.

This "cell disease" appears to be acquired, since it may be produced at will in animals. Cancer cannot, therefore, be regarded as an hereditary disease, but this does not imply that the inheritance of acquired characters may not play an important part in cancer transmission. The work of Miss Maud Slye on mice shows very well the importance of the factor of heredity in resistance or susceptibility to cancer, but it concerns indirect, rather than direct, inheritance of cancer.

One thus arrives at the conception of cancer as a cell disease, a special disease of which the *primum movens* is still unknown, and whose biological and morphological characteristics appear to be distinctly opposite to those of inflammatory phenomena. For inflammation results from the action of so-called pathogenic agents which may be mechanical, chemical, or parasitic. The development of the inflammatory process is liable to extreme variations, according to the importance of the multiple factors which come into play, such as the nature and amount of the causative agent, its virulence, its affinity for the tissue, on the one hand, and the susceptibility or resistance of the soil on the other.

Whatever may be the method of development the inflammatory action and reaction persist only in the presence of the pathogenic agent which gave them birth. It is thus, for example, that nodular or ulcerous lesions of syphilitic, mycotic, or dysenteric nature come to a stop and heal under therapeutic action which causes the causative spirochete, fungus, or bacillus to disappear. Thus the inflammatory processes stop or even regress as soon as the agent is removed.

Cancer, on the contrary, appears to result from the combined action of known and unknown causes, which produce in the cell disturbances of growth or of function. resulting in a quasi-definitive fertility. This fertility, which is transmitted to daughter cells, constitutes the essential characteristic of cancer cells; it is found in no other morbid process. It matters little whether the occasional or determining agent disappears, be it chemical, physical, or living; the new characteristics of the cancer cell will continue to follow the established rhythm. The study of the latent phase of coal tar cancer in animals is a good illustration of this fact.

Thus, the two great morbid phenomena which attack the organism—inflammation and cancer—appear to us today, from the biological point of view, distinctly different one from the other. And perhaps it is because we have mistakenly tried to bring them together that the majority of investigations on the origin of cancer have, up to the present time, resulted only in failure.

DISCUSSION

Prof. Ferdinand Blumenthal, Berlin: Most investigators are of the opinion that the causation of cancer includes several factors. Among internal factors is heredity; among external ones, in my opinion, belong the bacilli of the neoplastic group. This group was first discovered by Erwin Smith in plant cancer. Bacilli of this kind were then found in the tumors of a number of patients in the Berlin Cancer Institute; they were also found by Casimir Funk in Warsaw in a case of uterine cancer, and, in addition, in the Robert Koch Institute in Berlin in nearly all tumors of an Ehrlich strain of mouse cancer. The special affinity of these bacilli for cancerous tumors is shown by this.

The question arises, are these bacilli a part of the cause of the cancer in the cases where they are found, or are they only saphrophytes which have found in the cancerous tumor a soil that is especially favorable for their growth?

The latter supposition I cannot accept, for their capacity for producing malignant tumors, particularly in plants, but also at times in animals, raises them to an exceptional position.

To be sure, I also hold firmly to the *non-parasitic* origin of many cancer cases, but it seems to me probable that the bacilli, in the cases where they are found, do represent one etiologic factor. Their activity consists in the secretion of metabolic products that promote the growth of cancer, such as lactic acid, for example.

These products may also, as Carrel thinks, serve as direct incitors of tumorous growths. This would come about through the fact that they stimulate certain cells in the body to secrete a cancerous agent.

This brings us to the internal factor. The latter offers the medium in which the external chemico-physiological or parasitico-chemical factors become active. Here we have already something that can be seen. The works of Carrel, Rhoda Erdmann, and Albert Fischer call attention to the macrophages in the blood, which apparently originate in the spleen. We have succeeded again and again in producing cancerous tumors and carcinomata by injections of extract of spleen from cancerous rats, so that one may naturally assume that there is formed in the spleen a substance that is carried by the macrophages into the circulation, and which becomes an inciter of tumor. So active is the process that we have sometimes succeeded in producing cancer by means of lymph from cancer patients.

We must, therefore, determine, in the complex of the causes of cancer, the part played by the medium, in which the cause may become active, and must learn what it is that constitutes this essential condition.

Dr. William H. Welch, Baltimore: It is embarrassing to say that my experience goes back fifty years. I was working in Cohnheim's laboratory when he was developing his theory and before the publication of his well known work on tumors. I also had the privilege of watching the development of Virchow's monumental work, which included leprosy, tuberculosis and many other diseases. Nothing he demonstrated about tumors is more important than the bringing out the group of true tumors. From the group of true tumors he eliminated the infectious granulomata, including all the conditions included under that term. He did not think he had exactly limited and defined the group of genuine tumors. There were many discussions of goiter, Hodgkin's disease, and it was thought that there were many kinds of sarcoma which were not genuine tumors. His first formulation is not in the form usually stated. It was an "anlage"—a word which we cannot exactly translate into English.

I should like to see those discussing cancer take a broader conception of the Cohnheim theory. He took an interest in discussing the bearing of chronic irritation on the development of cancer. This subject was discussed almost as much and frequently fifty years ago as today. Why was it certain individuals exposed to irritation developed carcinoma and others did not? This question was discussed by Thiersch and other surgeons of the day. According to this theory, as Miss Slye has just stated, only certain individuals who had the anlage, along with this irritation, would develop carcinoma. The thing to be explained is why a small number do develop tumor.

I wanted you to know that these questions were discussed fifty years ago and much on the same lines as they are discussed today. Of course when Cohnheim stated his theory as to embryonic rests it eliminated a large group and it was predicted that more would be eliminated. According to his explanation these tumors arising from embryonic rests are not genuine tumors in his sense of that term.

There is food for thought in the fact that nearly all pathologists agree with Dr. Roussy and Dr. Ewing. Lubarsch made the statement years ago. At that time it was felt that cancer might be parasitic, but Lubarsch thought this proposition was quite debatable.

I do not think Dr. Ewing attempted to explain why we think that cancer cannot be due to parasites. We should keep an open mind on that subject. Dr. Blumenthal's theory is not at all irreconcilable with a parasitic theory.

Miss Slye's work is extremely interesting and we are proud of her. Her writings are among the best of those on the subject of cancer, and I am glad she has had the opportunity of speaking this morning in her strong and forcible way. I have never been satisfied with the way in which the subject of heredity has been treated.

I think with Dr. Ewing that there might be made some statement, not a controversial statement, and not so much to advance medical knowledge as to be satisfactory to the medical profession and the general public.

Those who live in an atmosphere of continuous controversy between geneticists and environmentalists will remember that one does not get anywhere if he limits himself to just one side of the shield and neglects the other side. Both sides must be taken together; they must not be separated. The genetic side of the subject as it has been presented is very suggestive and helpful as indicating the way in which we should look upon heredity and environment.

Dr. J. Maisin, Louvain: I want to express my opinion again. You know what I think in regard to susceptibility. My opinion has been fully expressed in my paper. I believe in cancer susceptibility and this conviction is based on well known experiments.

I want to say a few words also on cancer parasitic theories. I am a young man and it may seem somewhat presumptuous, but let us express what we know, not theories but facts based on experiments done in our laboratories. At the present time there is an enormous amount of experimental evidence against the parasitic theory of cancer, and few, if any, good arguments in favor of this theory.

Miss Maud Slye, Chicago: There are two rather brief points I would like to make. First, one of the difficulties in the general acceptance of the hereditary factor in the causation of cancer has been a misunderstanding of the work, as was illustrated last night by Dr. Ewing when he said, "Those who are working in this field attribute the origin of cancer to hereditary susceptibility alone." That is a statement I wish to refute without qualification.

No worker in heredity has ever taken such a position as this. In all my reports of the work in the laboratory I have repeatedly emphasized the necessity of an irritation or stimulation acting upon the hereditary susceptibility, to produce cancer. I emphasized both the susceptible soil and the irritating agent.

Secondly, I think a great deal of the unwillingness to make any use of the demonstrated fact of the hereditary factor is the idea that we are going to add to the hopelessness of the cancer situation. I wish to bring up some facts that will give a more hopeful atmosphere.

There are many points of great encouragement in these observations. The hereditability of resistance to cancer is a very encouraging fact, because it means that instead of everyone being susceptible, large numbers of people are wholly immune. Everyone, except those with an inherited tendency to cancer, is immune. This is certainly a most encouraging fact and it should be allowed to lift the fear of possible cancer from those who are by heredity immune to it.

Dr. Gustave Roussy, Paris (concluding the discussion of his own paper): I ask you to consider two or three points discussed before or after my paper.

The first point is in reference to the relation between cancer and heredity. With Miss Slye, I believe in the heredity of susceptibility and resistance to cancer, but I do not admit direct heredity of cancer. There is no direct transmission from parents to descendants, but an inheritance of susceptibility and resistance. This heredity transmits susceptibility to cancer or resistance to cancer but does not constitute an hereditary factor responsible for the causation of cancer.

The second point concerns Cohnheim's theory of the development of cancer, touched upon last night by Dr. Ewing and this morning by Dr. Welch. I refuse to admit that embryonic rests give rise generally to cancer; they will explain the appearance of benign tumors but they do not explain cancer. Everybody knows how very seldom these embryonic tumors are real malignant tumors.

Coming to the third point, that touched upon by Dr. Blumenthal, I want to insist on the difference between inflammation and cancer. In inflammation the tissues and cells are transformed rapidly to resist the injury, or they end by dying, while in cancer we have quite the reverse phenomenon. When the cell is transformed by cancer, it acquires properties which enable it to multiply itself indefinitely, and this important characteristic is transmitted to the daughter cells. In the biologic field I do not know of any living agent which produces that phenomenon.

THE TISSUE AND RACIAL SPECIFICITIES OF CANCER

By Dr. J. A. MURRAY, F.R.S., London, England
Director, Imperial Cancer Research Fund, London

HISTORICAL reviews of the developments of cancer research have so frequently been undertaken in the past 20 years that a repetition of the story would be of doubtful value and of intolerable dulness, for both myself and those to whom it is addressed. I shall, therefore, devote the space at my disposal to a survey of the development of the idea of specificity as it affects our conceptions of the cancer process. Incidentally, I shall refer to much of the experimental work which was undertaken with quite different objects in view. It was only natural that the envisagement of the cancer problems to be attacked by experiment was formulated in the light of our knowledge of cancer in man, and was directed to a solution of difficulties which had arisen during the 50 years preceding the discovery by Jensen and Borrel of the transplantability of the tumors of mice and rats to normal animals.

I. TISSUE SPECIFICITY

One of the most fascinating of these problems was that of the tissue specificity which characterizes the malignant new growths in the body of the individual attacked by the disease. The phenomenon is now so familiar to every medical student, that we are apt to be blind to its fundamental and striking character. When, for example, cancer starts in the epithelial covering of the tongue or great bowel, and in the course of its progressive growth tissues of quite different structure are encountered and invaded, they are pushed aside and compressed but do not acquire in their proper elements any of the features of cancerous proliferation. Metastatic nodules arising from embolic fragments of the primary growth arrested in the blood or lymph vessels of organs remote from the primary site (such as the lymph nodes under the jaw in cancer of the tongue, or the liver in cancer of the great bowel) repeat with the minutest fidelity the structural peculiarities of the primary growth, but do not transmit the cancer process to the cells of the lymph nodes or of the liver. When we reflect that the tissues which here seem to be refractory can themselves be the site of the primary cancerous transformation and that then the relations to other organs are reversed, the remarkable character of the restriction and the difficulties which it opposes to any obvious conceptions of the pathology of a process capable of such delicate discrimination, are enormous.

An analogous limitation to the spread of the process of cancerization obtains between the primary focus and the surrounding cells of the same kind. At a very early stage in the history of every malignant new growth, accretion of newly transformed cells stops, and thereafter the whole increase in size of the tumor takes place by multiplication of the cells already cancerous.

A welcome clarification of ideas in respect to both these difficulties has been achieved as a result of the experimental studies of the past 25 years. In the transplantation of the carcinomata of the mouse or rat to new animals, the epithelial part alone survives and a new connective tissue support and blood supply are furnished by the new host. The new growth, so far as its epithelial parenchyma is concerned, consists entirely of cells which are the direct descendants of the epithelial cells in the portion of tissue grafted. It is not surprising therefore that the newly formed tumor should be of the same kind as that from which it is directly descended, but it could not have been foreseen, as is the case, that the reproduction of minute, and of themselves insignificant, peculiarities of structure, should be so perfect as to make it impossible to say whether we have before us the third or the three-hundredth passage in a long series of transplantations. The inference which could be drawn with considerable certainty from the constancy of structure of a primary cancer as reproduced in its metastases, namely, that the essential changes in cancer are intracellular and not a consequence of alterations of the surrounding tissues or of the body of the affected individual, acquires the character of a logical demonstration in the light of these experimental observations.

The exceptions to this rule of constancy of structure during transplantation in series are few in number but of great interest. The first to which I would direct your attention is that of the peculiar malignant new-growths in which not one, but two, parenchymata can be demonstrated microscopically and by experiment. To a cursory examination the growths in question appear to be carcinomata with a rather cellular abundant stroma. A careful study shows that the stroma is itself the seat of independent proliferation—is, in fact, sarcomatous. Such growths receive the descriptive name of carcino-sarcomata or carcinoma sarcomatodes, and have long been known as curiosities of human pathology. Ehrlich, and after him Haaland and Russell, have recorded in minute detail the occurrence of identical mixed cancers during the propagation of carcinomata of the mouse. The investigations of the two latter observers leave no doubt that such mixed tumors arise by a secondary transformation of the stroma of ordinary carcinoma. Once the change has set in, the rule, which holds in ordinary transplantations, namely, the complete degeneration of the old stroma, no longer holds, and the altered stroma survives and takes part in the formation of the new tumor. It has, in fact, acquired the characters of malignancy and may be propagated apart from the epithelial moiety as pure sarcoma in a succession of normal animals.

There is another form of mixed tumor which presents so close a resemblance microscopically to these carcino-sarcomata that without experimental analysis they cannot be distinguished from them. Glandular or squamous carcinomatous areas are minutely interwoven with spindle-celled portions and it is only when the attempt is made to separate the cells of different kinds of transplantation to separate animals that the continued reproduction of the mixed structure in the daughter tumors forces the conclusion on us that the epithelial parenchyma is subject to structural variation within fairly wide limits. Drew has shown that such morphological variation is not the prerogative of malignant cells only, but that normal cells of squamous epithelium may, in tissue culture, grow either in a pure spindle-celled form or in the characteristic sequence from cuboidal to flattened squamous elements with formation of keratin.

The restricted focal origin of cancer at the primary site, with subsequent increase in size by division of the constituent cells of the cancerous focus, still remains enigmatical, but the experimental production of cancer by tar painting has rounded out our knowledge of those features of the process which gave rise to embittered controversy between pathologists as to the unicentric or multicentric origin of malignant new growths.

When a relatively large area of the skin of the mouse is repeatedly painted with tar, squamous carcinoma develops in about 6 months in a large proportion of the surviving animals. Growth does not begin all over the painted area but in one or more centers and if these are close together, a single tumor soon forms by coalescence. If the growths are more widely separated, two or more separate cancers may be produced. Deelman has shown, however, that even when the first tumor is apparently solitary, a plate-model reconstruction from serial sections frequently shows several centers which coalesce, not by cancerous transformations of the intervening epithelium but by extension of the separate foci till they meet. It is reasonable to conclude that in many cases of cancer in man when the primary focus is solitary this state is the result of the coalescence of initially multiple centers placed close together. It is still not understood why the cancerous process does not extend to the adjacent cells in the tarred area in the mouse experiments, or in the analogous circumstances in "spontaneous" cancer in man and animals.

Some hint of the nature of this disability of the cells in the neighborhood of a primary cancer focus may be indicated by a consideration of the phenomena in those curious conditions of relatively slight malignancy which lie on the borderland between the malignant and benign new growths. As is well known, primary multiplicity, rare in malignant tumors, is relatively frequent in those which are definitely benign. Cheatle has observed in a case of rodent ulcer that new centers arise in the apparently healthy skin, surrounding the central ulceration. The minute size and circumscribed character of these areas make it very certain that they are not derived by extension from the central mass but are examples of an apparently continuous formation of new separate centers of the disease process.

I have attempted to obtain information of the forces which operate to produce these results by experiments in which after removal of a primary carcinoma (tar or mammary) a course of tarring was started at another site. Similar experiments have been carried out by de Pienaar, Murphy, and Leitch and it is regrettable that complete agreement has not been obtained. In my experiments (relatively few in number) a second primary carcinoma was never produced. De Pienaar observed a certain amount of inhibition, as did Murphy, while Leitch states that there is no evidence of inhibition whatever. Further experiment is necessary, but probably all of us would agree that it is not easier to produce tar carcinoma in a previously cancerized animal than in a normal one. This conclusion acquires significance in the light of other experiments I have made in which the tarring of a second site was begun before the appearance of proliferative changes at the first. In not a few of the animals in which this has been done two primary growths have appeared simultaneously and grown progressively. This condition is therefore one of transient increased sensibility and whether it is followed by decreased sensibility or merely a return to normal probably depends on details in the experimental conditions which could only be ascertained by a long series of these extremely tedious experiments.

Those conditions which have been grouped together under tissue specificity run through all the ramifications of the cancer problem. Together with the phenomena of racial specificity which will occupy the second part of this paper, they lend to the problems of cancer pathology a precision and intricacy which make them unique in the realms of scientific medicine.

II. RACIAL SPECIFICITY

As soon as the fact of the transplantability in series of mouse and rat tumors had been established, the attempt was made to produce tumor growth in other species by the same procedure. Failure was complete, just as had been the case in the earlier experiments of inoculating human cancers into laboratory animals. Even the transference of rat tumors to mice, and vice versa, was found to be impossible, a mere temporary proliferation, followed by absorption, being obtained. Slighter differences than specific (in the zoölogical sense) were apparently a complete bar to transference so that, e.g., a mammary carcinoma of the wild mouse, which could be propagated easily in series in wild mice, grew only temporarily in a small proportion of tame mice. This difficulty could be partially overcome if the recipients were very young, and Murphy showed that transplantable mouse tumors could be cultivated in series in the egg membranes of the developing chick for many weeks. Regressive changes set in a few days before hatching and the tumors even if included in the body of the chick soon disappeared after hatching. Similarly, Gye was able to propagate mouse carcinoma and sarcoma in series in new-born rats, provided that inoculation was undertaken within twenty-four hours of birth, and subtransplantation within a week or ten days while the resulting tumor was still increasing in size. If animals in which such foreign tumors had receded were again inoculated with fresh material, not even temporary growth could be obtained. Russell showed that a preliminary treatment of rats with normal mouse tissues was sufficient to establish this primary effective resistance and the whole group of phenomena ranged themselves with the production of specific antibodies to foreign proteins.

Related, but not closely analogous, reactions of much less intensity occur within the limits of a single species, when, e.g., mice which have withstood a single inoculation of tumor material are found to have acquired an increased resistance to a second inoculation of the same or another mouse tumor. By direct examination of grafts in such resistant animals Russell and Woglom showed that the failure of the grafts was due to a failure of the new stroma reaction, and accordingly the induction of the resistant state was without influence on the progress of tumors which were already established and growing progressively. Still more disastrous to the hopes of a therapeutic application of this acquired resistance to cancer in man was the observation of Haaland that even the most intense preliminary treatment of mice with spontaneous mammary carcinoma was without effect on the incidence of recurrence or metastasis, or on the success of autoplastic transplantation.

The tissue and racial specificities which characterize the transference of malignant new growths to other individuals or other parts of the same individual, apparently so diverse and depending on independent mechanisms, are brought together in the features of the curious groups of neoplasms which occur in the domestic fowl, first discovered and described by Rous. Rous obtained three separate transplantable sarcomata of the fowl which differed from the sarcomata of mammals only in the fact that they could be transmitted to normal animals without the intervention of living cells. The three strains differed in histological structure and these differences were maintained when new tumors were produced either with dried tissue or with cell-free filtrates. Inoculation into other species of birds or into mammals was without effect and, just as in the experiments with wild and tame mice already mentioned, the original race of fowls (Plymouth Rock for Strain I) was by far the most suitable. Direct attempts then and later to demonstrate a similar behavior of the transplantable sarcomata of the mouse and rat have failed completely, and pathologists generally have regarded the Rous tumors as etiologically peculiar and unrelated to the other neoplasms of man and animals. The attempt by Gye, a little more than a year ago, to bring the other cancers into line with these neoplasms of the fowl, is within the recollection of all. His conception of a dual mechanism, a non-specific virus and a specific accessory factor derived from the host, still awaits confirmation. It is, at any rate, not compatible with those features of cancer to which attention has been directed in the present paper, features which in the past have raised insuperable difficulties to the acceptance of the hypotheses which have been framed to explain the causation and nature of cancer.

The experimental study of cancer has revealed several features of the disease, previously unsuspected, which as a matter of fact could not have been discovered by a study of the disease as it occurs naturally, in man or animals. Progress can only be delayed if these characters be ignored, nor is it unlikely that other peculiarities, at present unknown, will be revealed by future investigations.

THE CLINICAL VALUE OF CERTAIN PHASES OF CANCER RESEARCH

By FRANCIS CARTER WOOD, M.D., New York City
Director, Institute of Cancer Research, Columbia University, New York City

WHILE most of the experimental investigations on cancer in the past 30 years have been directed toward the larger question of trying to determine the cause or causes of cancer with the hope of discovering a simple method of cure, there still has been a very considerable amount of research, the results of which have had immediate practical application both in the surgical and radiological treatment of the disease. I shall discuss only three phases of such research.

It is some 13 years since Tyzzer showed that gentle massage of a transplanted mouse carcinoma greatly increased the number of metastatic nodules observable in the lung. This was the first experimental confirmation of what had been suspected in human beings by observant surgeons. But the number of Tyzzer's experiments was small and he obtained results with only one tumor, a highly malignant neoplasm of the Japanese waltzing mouse. With the Ehrlich mouse tumor No. 11 and the Jensen rat sarcoma he was unable to obtain metastases by massage of the implanted growths. Rous stated that in his experiments in massaging mice and rats with an adenocarcinoma, no more than a regular number of metastases occurred, but that the death of all the animals promptly followed.

Time passed with no further study of the situation except in the interesting observations of Handley on the permeation of lymphatics as observed by him, especially in carcinoma of the breast and the skin melanomata. Recently, however, the wide use of physical therapeutic methods by a group of more or less illiterate healers has unfortunately brought the problem again into prominence. The devotees of these cults frequently massage tumors in order to "drive the lump away." In this they are often too frequently successful, and patients now come into our hospitals with extraordinary distribution of tumor cells following such massage and manipulation. Such victims are practically all of them beyond help owing to the extensive distribution about the body of the embolic particles.

Stimulated by several such observations, one of my colleagues, Dr. L. C. Knox, repeated on a large scale Tyzzer's original experiments. A great variety of tumors was used, both sarcomata and carcinomata. Animals were inoculated subcutaneously and when the tumor reached the diameter of five millimeters it was gently massaged for half a minute on alternate days for a period of approximately two weeks. The growth was then removed by operation to prevent further spontaneous metastasis. This is necessary because it is very difficult to decide whether masses in the lung vessels are growing tumor particles or recently deposited emboli which might theoretically die without giving rise to a tumor nodule. The animals were allowed to live for some time and were then dispatched, the lungs distended with fixative, and a series of sections examined. The details need not be given here. Suffice it to say that in all of the tumors in which the cells were small in size, such as carcinomata and some of the sarcomata, massage in many—though not all—of the tumors considerably increased the number of metastases in the lungs in comparison with the controls whose tumors had not been massaged. Obviously those tumors which metastasize spontaneously in a high percentage of cases could not be expected to have that percentage greatly increased by massage. In such freely metastasizing and highly vascular tumors the distribution has occurred before manipulation is practiced hence less difference can be detected following the massage. Sarcomata of the dense spindle cell variety was not influenced by massage as might be expected from the difficulty of dislodging particles.

An interesting by-product of this experiment was a demonstration which confirms M. B. Schmidt's notions that many of the embolic tumor particles perish. If a tumor of the same type is grafted in two animals and both grafts massaged, the lungs of one will be found stuffed with embolic particles. If the other animal is allowed to live, very few growing nodules will be found ultimately in the lung. This shows that not all of such emboli obtain the necessary attachments to the vascular walls which enable them to obtain foothold and grow in the tissues. Most of them perish because, lying free in the blood stream, they are practically in the state of an *in vitro* culture and it is well known that tumor cells grow very poorly under these circumstances. It is necessary that the cells penetrate the tissues so as to obtain sufficient nourishment to enter upon any active growth. It is quite evident that such experiments, backed up by the unfortunate human examples available, point to two extremely practical facts. One is that of two tumors of equal virulence, the one that is massaged is likely to spread throughout the body more than the one which is not so treated. This massage may be a perfectly involuntary one, as is the case of a carcinoma of the tongue where the muscular movements of the organ tend to press the cells along the vascular and lymphatic channels. The other point is the avoidance of any extraneous manipulation, first by the patient, second by the fingers of the examining physician, and thirdly during the operative procedure. I am firmly convinced that an enormous amount of harm has been done in the past by the repeated manual examination of small superficial carcinomata of the breast.

Another phase of animal experimentation of a practical nature was a study of the results following the incision of tumors. In this interesting experiment some 400 animals were inoculated with the Flexner rat carcinoma, a growth which normally metastasizes to the lungs of a given strain of rats in approximately

20 per cent of the animals. These 400 animals were divided into two groups. In one of them a slice of tissue was taken out of the tumor; the skin was sewn back over the growth and at the end of ten days the tumor was excised to prevent further metastasis. The tumors of the 200 animals used as controls were also excised at the end of ten days so as to check the formation of any further emboli. Ten days was selected because that was the utmost limit required for the preparation of a microscopic section.

The animals were allowed to live for several months and were then killed, the lungs distended with fixative and examined for tumors. The percentage of metastases in the animals whose tumors were incised and in the controls were practically the same, showing, that at least in rats, using the Flexner rat carcinoma, no increased metastasis was caused by a carefully executed biopsy.

This by no means suggests that every surgeon can safely excise a piece of any or all tumors and wait ten days, a practice not only unnecessary but without justification; but I think the conclusions can safely be drawn that in such a situation where a diagnosis cannot be made clinically and where the necessary operation is a mutilating one, it is better to do a biopsy and immediately proceed with the operation than to wait until the tumor reveals its true nature by its development to a stage where it may prove inoperable.

The latter position is too frequently taken, even today. We too often see, for example, extensive tumors of the tongue with involvement of the cervical lymph nodes which have reached the stage at which no real therapy is practicable simply because of a slight improvement following the use of salvarsan or the inability of the observer to make a correct diagnosis early enough. All our cancer therapy turns on the avoidance of such errors.

Radiation is another somewhat different field in which facts of practical value have been elicited by experimentation with animal tumors.

In 1913 investigations were begun in the Crocker Laboratory as to the effect of radium on animal tumors. It was found that the lethal action of the radium was a direct function of the time and inversely as the square of the distance. But there was no temperature coefficient in the action between zero and 20° C. At 37° C. the tumors died quickly even without exposure to radiation. A formula was also published correcting the errors due to the fact that the radium was contained in a cylindrical holder. This correction formula, when applied, reduced the radium to a point source and permitted the comparison of various sized tubes. In addition it was found that the lethal action was a direct function of the quantity of radium employed and that the relation between quantity and time when plotted was a parabolic curve. When the observations were re-computed on a milligram-hour basis the curve assumed the shape of one-half of the probability curve. On logarithmic paper the observations plotted only fairly well as a straight line while on logarithmic probability paper the observations were remarkably close to the theoretical straight line. Various animal tumors were found to have varying lethal points. The determination of this lethal point was made by inoculating small particles of tumors after exposure.

About 1915 an extensive series of investigations was begun, X-rays being used, and again it was found that when the observations were plotted with the percentage of tumors growing as ordinates and the time of exposure as abscissæ, the curves were quite similar to that produced by radium. The filtration of the radium and the filtration of the X-ray have no effect on the shape of the curve, hence it was probable that this curve could be obtained by any destructive agent acting upon cells. This is now a well known fact, because hemolysis of red cells, the killing of typhoid bacilli by disinfectants, the killing of tumor cells by heat, the killing of the eggs of the fly drosophila by X-ray, have all been shown to lie in the same family of curves.

With the X-ray it was again found that different animal tumors had very different lethal points. This was at a period when Seitz and Wintz had brought out their "carcinoma" and "sarcoma dose" and the best evidence in refutation of that idea was obtained from these animal experiments.

With both radium and X-ray it was soon found that the dosage required to kill all the cells of the tumor either *in vitro* or *in vivo* was approximately the same. In other words, the dose required to prevent the growth of tumor particles after inoculation and the dose required to kill an animal tumor within the tissues of the host were in general between four and five light human skin erythemas. Using the heavier erythema dosage in carcinoma the lethal dose for all cells became about two and a half erythemas.

These high values were promptly rejected by the practitioners of the art of radiotherapy as impossible, such workers claiming that all the cells of a tumor could be destroyed with but little in excess of an erythema dose. But as more experience has been obtained it is being slowly acknowledged that the human tumors and the animal tumors have about the same capacity for resistance to radiation. The present exponents of radium and X-ray therapy are now freely acknowledging that a clinical cure may be obtained without destroying all of the cells of a tumor, but that these cells remain locked up in the dense scar tissue produced by radiation and may so remain in a harmless state for many years. Late recurrences may, however, take place, and in my own experience I have seen one after thirteen years of complete quiescence.

The modern technique for treatment of malignant tumors of the cervix with radium applies to the tumor area about the same dosage as is required to kill all of the cells of a mouse tumor.

While animal tumors can be used as biological material for standardization of X-ray machines, and have been so employed by a few workers, the technique is difficult and the number of animals required rather large.

One of my colleagues, Dr. Charles Packard, has recently found that the eggs of the fly drosophila when freshly laid are extremely sensitive to radiation and as the flies cost practically nothing to keep in large numbers and the eggs are easily obtainable, it may be that this biological material may be adopted as a check for radiation dosage or the calibration of ionization apparatus. It is certain that those who have used the animal tumors in testing their machines have found them useful, and I think that such use has introduced a wholesome conservatism concerning the power of radiation to produce permanent cures which has been a very valuable asset to the whole subject of radiotherapy.

Several problems remain. One is the question of the possibility of a difference in the effectiveness of rays of different wave lengths. There has been a general assumption that highly filtered radium yielding extremely short wave γ-rays is more effective than the longer wave X-ray, and that the short wave X-rays are more effective than the long wave. Extensive experiments on these lines have been carried out in my laboratory with the use of an extremely accurate source of continuous voltage. When two wave lengths were used, one approximately six-tenths of an Ångström, the other two-tenths, a range which covers the present clinical use of radiation for X-ray, no difference in effect on amimal tumors could be found when the intensity of the radiation reaching the tumor particles was measured by an open ionization chamber of the Duane type. This opinion has been criticized, chiefly by Russ and Dognon, but in my opinion Russ' criticism is not valid and Dauvillier has pointed out certain sources of error in Dognon's work. By applying proper corrections it was shown that instead of proving a difference of effect, as Dognon assumed, between the wave lengths, he actually proves the contrary.

A number of the German investigators in this field have recently held that there is no difference in effect of the different wave lengths, so that the majority hold to this point of view. It is important that it be tried on other biological material, and such experiments are being carried on in my own laboratory. Should the results finally show that it is only the energy absorbed by the cell which is effective and that the Duane chamber furnishes an approximate measurement of that energy, then the choice of wave lengths will depend solely upon the amount of tissue which intervenes between the skin and the tumor. Short wave lengths will be employed for the deeper radiation and longer wave lengths for the superficial, and radium will fall into its true place, its value being largely due to the convenience with which it can be inserted into accessible tumors and there exert a powerful destructive effect while not too severely damaging the body as a whole. The tendency of the modern expert is entirely in the direction of using both agencies.

Another important question remains unsolved, and I think its solution will be obtained by working on animal tumors. This question concerns the point raised by my eminent colleague, Professor Regaud, who holds that very prolonged, highly filtered radiation is more effective than an equivalent quantity administered in a short time.

A final question still under discussion has been attacked by me experimentally, and that is the mode of action of radiation. Is this action wholly a direct destruction of the tumor cells or does the body of the host, especially the connective tissue in and about the tumor, take on an actively destructive capacity, not of a purely mechanical nature? My own opinion has been and is that the connective tissues of the host have no positive capacity to damage the tumor cells. The basis for this opinion is that the killing point of a tumor *in vitro* and *in vivo* is the same, at least in animals. If the connective tissue has any positive capacity to aid in any way, the tumor in the animal should be killed more rapidly than the tumor *in vitro*. I do not for one moment deny that the damage to the terminal arterioles with the resultant diminution in nutrition and the subsequent sclerosis of the connective tissue which takes place under the action of X-ray may actually prevent the growth of tumor cells still remaining in the interstices. One of my colleagues, Dr. Heiman, has done an experiment of great interest in this connection. He has shown that a highly virulent carcinoma can be implanted in the center of a slow-growing fibro-adenoma of the rat and that the carcinoma remains for the rest of the animal's life incarcerated in the center of this fibrous mass. Only so much of the carcinoma lives as the food supply permits. But if, after months of such incarceration, the fibroma is split open and the carcinoma is taken out and implanted in an animal, it shows all of its malignant qualities unimpaired, and rapidly kills its new host. This fact, it seems to me, strengthens the position of those who hold that the tissues of the host have no direct destructive action on the tumor cells. They may protect the organism by furnishing a barrier through which the tumor cannot grow, but beyond that they are not effective.

I think that these few examples of what may be called the practical results of animal experimentation have been of not inconsiderable present value in shaping our therapy of cancer.

DISCUSSION

DR. ROLLIN H. STEVENS, Detroit: I was not sure whether Dr. Wood said there was no action upon the capillaries and no action upon the lymphatics.

DR. WOOD: There is action on the terminal arterioles, of course, but not on the capillaries, and the lymphatics also escape.

DR. ALEXANDER PRIMROSE, Toronto: Dr. Wood referred to the definite relation between the research laboratory and the clinical side of our work. It occurred to me that we should try to bring that about more widely, for it seems most important that we should apply, whenever we can, the things done in the laboratory, often without immediate bearing on clinical practice. That they have a bearing can be illustrated from an historical standpoint.

Think back, for a little, to Pasteur's work. Only a few men were able, at that time, to utilize his achievement; Lister was the only man who could apply it practically and clinically, for his colleagues had not had similar training. The great clinical results of Pasteur's work were therefore postponed for a quarter of a century. I think that today many of the things evolved in the laboratory should be more quickly applied in clinical work.

I was especially interested in what Dr. Wood said about breast cancer and massage. That has attracted my attention for some time. This Society might point out to the public that there should be no manipulation and disturbance of nodules in the breast.

Secondly, I feel that many doctors should be informed of this, as we all know many of them do not handle these growths as they should.

Thirdly, and most important, nurses in charge of these cases should be instructed to handle these breasts with the utmost gentleness, and without manipulation. When we have evidence to prove that dissemination is produced by massage, this knowledge should be broadcast.

Dr. Wood referred to the question of quick sections. In various parts of this country a large majority of surgeons consider that quick sections afford a safe and conservative procedure at the time of operation. I have always believed that that is by no means the case. My opinion was strengthened this summer when I saw sections in a case in which there was some localized enlargement of the breast from chronic mastitis, and when this was traced down definite malignancy was found in one portion. What would a quick section do in a case of that kind? I am convinced that the faith some individuals put in quick sections today is badly placed. They have their place, but it is dangerous sometimes to cut into a growth, and when you do, it is not always conclusive.

DR. FRANCIS CARTER WOOD (closing the discussion of his own paper): The value of rapid section is directly proportional to the intelligence of the pathologist. If he has courage enough to say he does not know what a tumor is, no surgeon will be misled. If a positive diagnosis cannot be made from the frozen section, the surgeon should be so informed; then either more material should be obtained, or he should go ahead on the clinical evidence. Mistakes have been made, but they are not comparable to those which would have occurred without such frozen sections. I recall only one error from over-caution. It was a case of Paget's disease, and on freezing we discovered a small duct involvement for quite a distance from the original growth. We had an extensive operation done for what was a local growth.

It not infrequently occurs that the surgeon will not operate unless we prove it is carcinoma; I recall three cases in which the surgeons were unable to make a clinical diagnosis and yet carcinoma was shown by frozen section.

I think that any general acceptance or condemnation cannot be made; it depends on the experience of those who are working. It takes an extraordinary amount of training and a great willingness to say the diagnosis cannot be made unless you have more material. It is absolutely impossible to make 100 per cent diagnoses. We have been using the frozen section in my hospital for 25 years and are using it more and more every day. My assistant spends every morning in the operating room deciding what operation shall be done.

THE PRACTICAL VALUE OF RESEARCHES INTO THE CAUSES OF CANCER

By Dr. ARCHIBALD LEITCH, London
Director, Cancer Hospital Research Institute, London

THE first gleam of light which broke through the gross darkness in which the origin and the causation of cancer were enshrouded was shed by Percival Pott a century and a half ago. Until then, everybody believed that cancer was a general or constitutional disease of unvarying though unknown cause. Such ideas are still prevalent and may not readily be eradicated, but to their dominance one may justly attribute the mass of unproductive speculation that clouds our councils, much of the years of investigation that have been errant and fruitless, and not a little of the despair with which the public regard the whole cancer question. Pott's immortal observation—what a little thing it may appear when we see spread before us the world-wide distribution and the appalling prevalence of cancer, a cloud no bigger than a man's hand in the sky—was that chimney-sweeps were especially prone to cancer of the skin of the scrotum as a result of the local action of soot. Why this part of the skin, no more exposed to the soot than any other part of the body surface, should be picked out so exclusively; why chimney-sweeps' cancer should be practically confined to England, and why such a small percentage of sweeps (no more than 1 in 1,000) should be affected, are problems that are still unsolved. No one will attempt to minimize their importance for they are questions that attend every form of cancer. The pioneer, however, had established that there was a peculiarly localized cancer, that it was usually preceded by a simple and tractable lesion, a wart, from which it slowly and imperceptibly evolved, and that a definite causal agent could be implicated convincingly if not with absolute certainty. It was my good fortune, three years ago, to give the experimental proof of the cancer-producing property of soot. The mechanical action of the particles could be excluded as a causative factor, for animals living amongst soot or to the skin of which soot was applied, remained unaffected, but when we mixed the soot with the fatty secretion of sebaceous glands a fraction passed into solution which was highly effective in producing cancer of the skin. Of the lessons to be learned from this particular form of cancer it may be appropriate here to mention one. The amount of active agent in operation must at all times be incredibly minute in the case of the human subject—just such a tiny fraction of the few imponderable grains of soot present as can be dissolved in the oily constituent of the almost imperceptible moisture on the skin surface. It would be as far beyond chemical analysis as the amount of gold in a drop of sea water. And yet it is sufficient, acting year in and year out, to produce a reaction which we call cancer.

Pott's observation, corroborated indeed by others, but left with its insistent questions unanswered, remained unique for exactly a hundred years. It stood as the solitary known instance of a form of cancer associated with a definitely ascertained causative agent. In the last fifty years, however, slowly and with long pauses between, there have accumulated a number of analogous examples, and with recent years, mainly as the result of experimental investigation, they have assumed great importance. Though in themselves these particular cancers may be of little practical interest, since, by comparison, the gross mortality from them is negligible, the lessons to be learned from their study, from their causes, from their evolution may point the way to the discovery of the various causes of, and to the appreciation of the early and remediable stages in, the more common and prevalent forms of cancer. Let us consider briefly some of these examples.

In 1775 Volkmann of Halle described a few cases of cancer of the anus and scrotum occurring in workmen in the lignite distillation plants who had been exposed for several years to the action of crude oily products that have been described indifferently as tar or paraffin. Only a very few such cases have been recorded and for the last 40 years no more has been heard of the occurrence, possibly owing to the fact that some change in the technical processes has protected the workers against soiling by the crude products. More striking examples have been known for at least 50 years in a small area in Scotland where mineral oils are distilled from shale, and recently Scott has given us the results of his 20 years' study of the conditions under which these cancers develop, so that we now know and can recognize the earliest changes in the skin that long precede the appearance of the cancer. Further, crude mineral oils of a different class—the petroleum oils—have definitely been implicated as cancer-producing agents in workmen engaged in refineries in Czechoslovakia, Galicia, Silesia, France, the United States, and England. With these crude shale and petroleum products we have produced simple and malignant tumors, carcinoma and sarcoma as well, quite readily in animals, so that, although the instances in man are few and scattered, the relationship between effect and supposed cause has been indubitably established by experiment. Indeed, experiment has gone farther than mere substantiation of clinical observation, for our investigations have shown that refined mineral oils, previously unsuspected, may retain the cancer-producing property found in the crude products. The practical value of such work lies in the fact that much larger numbers of people are exposed to refined oils than to crude oils. Recently in England it was discovered that cotton spinners, and almost exclusively the mulespinners, are abnormally liable to cancer of the scrotum and anus, and we have been able to show that in their case this was due to the continual soiling of the parts with the minute droplets of mineral lubricating oil thrown off by the rapidly revolving spindles. In view of this demonstration, similar cases are now coming to light in other industries where soiling with mineral oil is common and the worker is exposed to it for several years.

We have long been familiar, too, in England with the occurrence of skin cancers in workmen engaged in the distillation and use of coal tar and in the manufacture of patent fuel from pitch. The incidence of epithelioma is perhaps higher amongst these than in any other of the dangerous occupations, and we have had good opportunities of observing the long periods of exposure necessary for the induction of cancer, the variability of individuals, and the precancerous conditions. It may be said that the clinical knowledge of cancer in tar workers formed the starting point of these experiments of Yamagiwa and Ichikawa which have been so extensively developed within recent years and which have opened so many avenues of useful information. It would take too long even to mention the observations that have been made experimentally with coal tar but some of the main deductions will be referred to later.

In the seventies, Maxwell, a medical missionary in Kashmir, directed attention to the frequency of cancer of the skin of the thighs and abdominal wall among the natives in that part of India. This he attributed to the custom of wearing an earthenware pot containing burning charcoal under their robes on account of the winter cold, and the cancer is usually known as Kangri cancer. His successors have amplified our knowledge of the disease. Owing to the frequent destruction of the wicker covering, these heated pots come into direct contact with the skin and burn wounds result. Cicatrices and indolent ulcers are very common. More proliferated lesions, such as multiple single wart formations, are not rare, and often progress to epitheliomata. Here again we have an instance of oft-repeated stimulation—namely, heat—over a period of years bringing about the reaction of neoplasia. A similar thing has been found, though very rarely, on the skins of locomotive engine drivers in England owing to the intense heat of the furnace fires.

The medical missionaries in the East have made us familiar with another form of cancer attributable to a more or less definite cause, namely, betel cancer. Betel-chewing is an old established habit widely prevalent in the Orient. The substance chewed is composed of the betel leaf, tobacco, areca nut, and lime: in all probability the last ingredient is the chief harmful agent. The cancer is found on the inside of the cheek and on the gums where the "chew" rests, and it is preceded by a leucoplakic condition and flat warts. We have knowledge of its prevalence in southern India, Ceylon, the Philippine Islands, and Formosa, but though betel-chewing is indulged in by millions of men, women, and children, we have no records of betel cancer except from these places. The association between the buccal cancer and the local stimulant would seem to be causal, but so far as our own information at present goes we must conclude that the substances are relatively weak cancer-producers.

The number of X-ray workers who have fallen victims to cancer of the hands as a result of constant exposure to unscreened rays is a dramatic demonstration of the cancer-producing property of a definite agent. The changes in the skin that long precede the appearance of cancer, the fissuring of the epithelium, the indolent ulcerations, and the irregular warty proliferations are well known and recognized, as is also the great tendency to multiplicity of independent growths. It is highly probable that the lessons so expensively acquired and with so much suffering by the older generation of radiologists will prevent the occurrence of this cancer in the future. It hardly needed the laboratory confirmation that it has received to establish the relationship between cause and effect. It may be of interest to mention that it was by this medium that cancer was first produced experimentally in animals. French observers, Marie, Clunet, and Raulot-Lapointe, obtained a sarcoma in a rat exposed frequently for many months to X-rays, the tumor arising some time after the applications had ceased. The claim was disputed on the grounds that in man the X-rays induce only epithelioma and that the rat tumors appeared long after they had been suspended. I have seen a sarcomatous nodule on the back of the hand of a radiologist, and our experiments in delayed effect have convinced us that the second objection is not serious. It would appear that the X-rays form the most rapidly acting cancer-producing agent in man that we have yet defined, as well as being the most intense.

In all these examples I have cited to you the cancer is a reaction occurring locally where the causal agent has been applied, and in all cases, though the agents have been quite dissimilar, the resulting cancer is identical in all respects. There are two other forms of cancer attributable to a known agent which seem to differ from these.

1. Forty years ago Jonathan Hutchinson called attention to a condition now well recognized by radiologists, namely, the tendency to the development of epithelioma in patients suffering from psoriasis. He showed that the two conditions were quite independent but that the epithelioma was produced by the arsenical preparations used for the treatment of the psoriasis when these drugs had been used for long periods. The same thing occurs in arsenic workers. I have seen men who have long been engaged in the manufacture of weed-killer, sheep-dip, and various commercial preparations of arsenic who exhibited at one and the same time a whole series of skin lesions from the trivial to the serious, localized hyperplastic patches, small horny warts, ordinary papillomata of various sizes, transitional warts and ulcerated epitheliomata. The arsenic taken into the body by ingestion or inhalation is excreted in the skin all over and consequently the neoplastic reactions may be widespread and multiple and there is no particular area of the skin that is more liable to be affected than another. We have produced epithelioma in mice by applications of weak arsenical solutions

but these animals, generally so susceptible to other carcinogenic agents, are apparently less susceptible than men to this particular substance. We have no evidence that arsenic has this cancer-exciting action on any other tissue than the skin.

2. Aniline workers' cancer is confined to the urinary bladder. The liability of dye-workers to develop cancer of the bladder has long been recognized in Germany and Switzerland and it is making its presence obvious in the mortality returns in England. Despite much study of the question in Germany and a considerable amount of experimentation on our own part, we do not yet know what particular dyestuff or what preliminary chemical product is to be implicated. It is possible that several different compounds may be responsible for the condition. Whether these gain access to the system through the skin, by ingestion or by inhalation we do not know, but at any rate it is obvious that the noxious substance has a selective affinity for the bladder mucous membrane or that the active agent is some final product that is formed in the urine in the bladder itself. The lesions are confined entirely to the bladder and are not found in other parts of the urinary tract. It would seem that the cancer is preceded usually if not invariably by villous papillomata.

There are other instances that might be mentioned of more or less definite cancer-producing agents but these are the most familiar. Putting together the main points gained from a study of these forms of cancer and some of the results that have been gleaned from recent animal experiments where we can order our conditions with precision, we have something concrete to guide us, something surely established, when we approach the investigation of the more prevalent forms of cancer where we know nothing definite of the causes and little of the preceding or preliminary conditions.

I. THE PRODUCTION OF A CANCER IS A VERY SLOW PROCESS

In the occupational cancers and in X-ray cancer we can find out in most cases how long the individual affected has been subjected to the action of the cancer-producing agent and in all those in which we have exact records the time necessary for the production of cancer is to be measured in years. Very rarely indeed is it less than 10 years, and in the average it is about 40 years. The best statistics we have on this point have been elicited by a recent Government inquiry we have had in England on mulespinners' cancer and it is typical of the others. Perhaps in pitch-workers' cancer the average is shorter on the whole but the figures are small. My impression is that the preparatory period in X-ray cancer is the shortest, but in all cases it is a matter of several years. In experimental work with mice the times vary somewhat with different agents. Thus in one case I have induced a malignant tumor in 37 days with pitch, and in another case the earliest took 19 months with a mineral oil. Even with one and the same agent the times vary enormously in different individuals, but in comparison with the life span of mice the time is always very long. Experiment has demonstrated quite clearly that the reason why cancer occurs most frequently in middle or old age is that the responsible agent takes so many years to produce its effect. Thus if we take two series of animals, one old and the other young, and subject them to the action of the same carcinogenic agent, say coal tar, we find that the cancer will appear as early or as late in the one case as in the other. Seeing, therefore, that in all the instances where we know the causal agent the time of preparation of the cancer is measured in years, and taking into account the fact that the different agents all produce the same kind of cancer, we can justifiably deduce that similar cancers in which we do not know the cause must have had an equally long preparatory period, and when we seek to find the causal agent we must turn our minds to the consideration of something that has acted over a great length of time.

II. CANCER IS THE TERMINAL PHASE, OR EXTREME PHASE, OF A REACTION

During the earlier years of exposure to a cancer-producing agent there is no detectable evidence, nor is any to be expected, of a change in the tissues on which the agent has been in operation. Even the microscope fails to reveal anything that seems of serious import. In our experiments we can find no constant feature that would enable us to recognize a potentially cancerous tissue at this stage. Eventually changes appear: local hyperplasia, small ulcerations or fissures, simple wart formations, and these are as characteristic of man in the instances already mentioned as they are of experimental animals. We must not push the analogy too far. Even in animals, though it is rare in our experience, the first suspicious sign may be the malignant tumor itself; or the preliminary stages may be exceedingly brief instead of the gradual evolution we usually obtain. In human cases in general the preliminary stages for the most part are unknown: they may not exist or they may not have been observed by the patient, but one feels that a more systematic investigation would elicit their presence. Now the process may be arrested at the stage of simple tumor formation: the papilloma may remain as such until the death of the individual.

The causal agent need not remain in action until the appearance of the malignant tumor. We have shown experimentally that we can suspend the applications after a certain time, yet while there is no visible reaction on the part of the tissues, and in the process of time precancerous conditions will develop, simple tumors will arise, and epithelioma will make its appearance just as if the agent had been in operation over the whole period. This is a very striking fact, and we have corresponding instances in the human subject where carcinoma has arisen in the characteristic localities years after the individual has been removed from all contact with the cancer-producing substance. We may safely conclude from these observations that the tissue cells have been so altered, in some way that we do not yet know, that they have acquired, or regained, the power of limitless proliferation—a potentiality which may lie dormant for many years. And we shall draw from this the subsidiary conclusion that in searching for the unknown causes in other forms of cancer we may expect to find that they have ceased operation in some cases long before any lesion was evident.

III. ONLY A VERY SMALL NUMBER OF THOSE EXPOSED TO THE ACTION OF A CANCER-PRODUCING AGENT DEVELOP CANCER OR INDEED ANY OF ITS PRECEDING MANIFESTATIONS

Naturally the agents will differ among themselves in their potency, and of the numbers subjected to one and the same agent there are striking differences in the extent of individual responses. In our experimental work where we can concentrate the intensity of the stimulation we may get approximately 100 per cent of positive results with some agents and sometimes as few as 1 per cent with others, and further, if we take a large number of animals and subject them to one particular cancer-producing agent we shall find that one will develop papillomata which will remain simple, another will develop a carcinoma in a few weeks, still another will be resistant for many months, and some may not react at all. In the human subject there are similar variations. Of the known agents X-rays seem to have given the highest proportions though we have no exact figures on the point. In chimney-sweeps, for example, only 1 in 1,500 is affected. The incidence in mule-spinners is rather less. From what we know in man it is reasonable to conclude that for every case in which cancer develops there must have been a thousand or more who have been subjected to the same agent and yet have escaped entirely; and we may draw the further conclusion that at all times the operating causes of cancer must be extremely common. Now why do so few succumb and so many escape, and why is there such variation among those who respond?

IV. THERE IS NO GENERAL OR INHERENT SUSCEPTIBILITY TO CANCER-PRODUCING AGENTS

It is a matter of clinical experience that if a malignant tumor be completely removed so that the patient lives without recurrence of the original growth, he is no more prone to develop a second independent cancer elsewhere than is another individual.

Dr. Murray has also demonstrated this fact experimentally in animals. He found that if he removed mouse tumors, either spontaneous cancers or those produced by coal tar, and subjected these animals subsequently to repeated applications of tar, it was always difficult to induce a second neoplastic response. So far from being easier or quicker, it was rather the opposite. Again, it is no easier to induce a tumor in an old animal than in a young animal. Nor can we ally any antecedent circumstance or environment with the faculty of responding to a cancer-producing agent. There is a radical difference between cancer and microbic diseases in this respect.

V. CARCINOGENIC AGENTS ACT IN EXCEEDINGLY SMALL QUANTITIES

The amount of soot, tar, pitch, mineral oils, and the rest of them, in action at any time is hardly detectable. We shall, therefore, expect that the difficulties that will face us in endeavoring to ascertain the unknown agents responsible for the great mass of cancers will be of the first magnitude and will long defy chemical investigation even if they happen to be substances foreign to the economy. Again, if these substances be pathologic products elaborated in the body, as one imagines is most frequently the case, their chemical analysis will prove more difficult still.

VI. CANCERS, TO ALL INTENTS AND PURPOSES IDENTICAL, MAY BE THE RESULT OF WIDELY DIFFERENT CAUSES

It is obvious from our experiments that the course of events and the kind of cancer resulting, namely, squamous cell carcinoma, is the same whether we use as carcinogenic agent coal tar, mineral oils, arsenic, certain synthetic preparations we have elaborated, nematode worms, or other substance. Looking only at the result, we could not possibly determine the causal agent. The same thing applies to the forms of industrial cancer that I have already mentioned. We may, therefore, expect a similar diversity of causes obtaining over the whole range of cancers, and it will be only by a consideration of attending or preceding circumstances in particular cases that we may hope to succeed in identifying the particular causes. On the other hand, we have produced such dissimilar cancers as squamous cell carcinoma and sarcoma by one and the same agent. And I may end this section by the statement that all tissues are not responsive to any definite cancer-producing agent. Even when one tissue, such as the skin, re-acts, some parts of it are more susceptible than others. Glandular epithelium in general is not responsive to the agents which induce cancer of the skin. It is probable that carcinogenic agents have selective properties.

When we know the causes of groups of cancers we can do a great deal to prevent their occurrence, and that, I take it, is the ultimate aim of every experimenter. Until the time comes when this is within the sphere of the practical, however, we may do much to defeat that disastrous consequence by a study of the earlier phases of reaction before the development of cancer. When we cannot ascertain the prime causal agent—and in the great majority of cancers it is beyond us at present to ascertain this agent—it is obvious that we cannot with certainty recognize an early precancerous stage. It then becomes a matter of determining by statistical studies, carried out over a number of cases, the liability of certain local pathological conditions to pass into malignancy. In some situations and with certain types of morbid states this percentage of calamity may be small and negligible, whereas in others it may be very large. Numerous examples will occur to the mind of every physician, but instead of leaving it to the impressions of the individual we must have the information as exact as it is possible to make it, so that the surgeon, knowing the liabilities involved, may by simple methods be able to prevent the onset of cancer.

THE PREVALENCE OF CANCER AS REVEALED BY MORTALITY RETURNS AND AT AUTOPSY

By Professor W. M. de VRIES, Amsterdam
President, Netherlands Cancer Institute; Professor of Pathologic Anatomy, University of Amsterdam

IN preparing my paper on "The Prevalence of Cancer as Revealed by Mortality Returns and at Autopsy," I have tried to ascertain the real knowledge we possess of this subject.

A great number of scientists and physicians, as well as statisticians, have been interested in the prevalence of cancer, and a great many publications are to be found in literature—so many, indeed, that it is impossible for me to give an abstract of literature on this subject in the short time I am allowed for my paper.

I can give you only my own opinion, which is based on literature as well as on my experience in cancer, as I see it in the postmortem room.

From the beginning of my professorship in morbid anatomy at the University of Amsterdam in 1909, I have been interested in cancer; in these 17 years more than 1,200 cases of carcinoma have been found at autopsy in my laboratory and most of these cases I have studied myself. Such a large number of autopsy cases is valuable material; only it is rather difficult to see its exact and real value, that is, not to overestimate nor to underrate its importance.

I am going to use the terms "cancer" and "carcinoma" in the same sense, meaning the epithelial malignant tumor that is called "carcinoma" by the pathologist.

My *autopsy* tables contain only cases of carcinoma; other malignant tumors are excluded, because they are less frequent (±200) and may follow other laws, regarding age and localization, than carcinoma; in *mortality* tables we find cancer and other malignant tumors together. However, in these tables the other malignant tumors are also rare; for instance, in the latest Report of the Statistical Bureau of our Kingdom we find for 1924, 295 cases of sarcoma against 7,844 cases of carcinoma (other still rarer tumors, as glioma, included). We may safely admit that this small number of sarcoma cases does not increase the existing inaccuracy of mortality returns. I use for my argument principally the autopsy tables of my laboratory and the *mortality returns* of Amsterdam and of the Netherlands. I hope you will find them sufficient for judging the value of these statistics in general. I can refrain from mentioning mortality returns of other countries, as Deelman is going to speak about cancer in different races.

I. CANCER AT AUTOPSY

I will begin laying before you the facts regarding cancer as revealed at autopsy in my laboratory, and then proceed to discuss their value and the value of analogous statistics for our knowledge of the prevalence of cancer. It is necessary to give some particulars about my laboratory and the hospital, because autopsy statistics largely depend on these.

My laboratory is in the Binnen-Gasthuis, a general hospital in the oldest part of Amsterdam, that has served as such since 1579. It is a university hospital and it has wards for internal medicine, surgery, neurology, dermato-venerology, otorhinolaryngology and children's diseases; it has no wards for infectious diseases, psychiatry, ophthalmology, gynecology, or obstetrics.

The distribution of the beds is shown in Table I.

TABLE I.—NUMBER OF BEDS ASSIGNED TO DIFFERENT WARDS

	Males	Females	Children
Internal medicine	110	100	Total Number 118
Tuberculosis	20	32	
Nervous diseases	54	47	
Surgery	93	70	
Otorhinolaryngology	9	9	
Dermato-venerology	43	47	
Total	329	305	118

From September, 1909, to February, 1926, 8,500 autopsies have been performed with 1,249 carcinomata (14.7 per cent). Most of the diagrams in this paper relate to the years 1910–1925, a period of 16 years with 8,295 autopsies and 1,215 carcinomata.

Although there is an almost equal number of beds for males and for females (329 and 305), there is a large difference in the number of autopsies of males and females (Table II).

TABLE II.—AUTOPSIES

Age	Males	Females
0 to 18 years	902	640
0 to 40 years	1,929	1,311
All ages	5,027	3,329[1]

[1] Age unknown in 144.

In general there are 3 autopsies in males against 2 in females. However, in carcinoma it is especially the ages of 40 years and over that interest us; for this period of life the ratio in the number of autopsies is the same: that is to say, there are 3,097 autopsies in males, and 2,018 in females. In old age the ratio changes, and we have the following: between the ages of 71 and 80, 512 autopsies in males, 412 in females; above the age of 80, 111 autopsies in males, 152 in females.

The number of autopsies in relation to age and sex are found in Table III, which also contains the number of carcinomata in these periods of life.

TABLE III.—AUTOPSIES IN RELATION TO AGE AND SEX

Age	Males			Females		
	Autopsies	Carcinoma	Per Cent	Autopsies	Carcinoma	Per Cent
21–30	416	6	1¼	297	7	2.4
31–40	488	31	6.4	304	28	9.2
41–50	639	103	16.1	412	56	13.6
51–60	924	199	21.5	490	108	22.0
61–70	901	292	32.9	550	114	20.7
71–80	511	152	29.5	414	83	19.8
81–	111	27	23.4	152	25	17.1
Age unknown		12			6	
Total		822			427	

If we take the fortieth year as a limit, the relation as to age and sex in 8,500 autopsies is shown in Table IV.

TABLE IV.—RELATION TO AGE AND SEX WITH FORTIETH YEAR AS LIMIT

Age	Males			Females		
	Autopsies	Carcinoma	Per Cent	Autopsies	Carcinoma	Per Cent
0–40	1,929	37	1.9	1,311	35	2.7
41–more	3,097	773	25.0	2,018	386	19.1
Age unknown		12			6	
Total	5,027	822	16.2	3,329	427	12.6

In 145 autopsies age was unknown.

In these tables there are some peculiarities:

1. The well-known influence of age in the prevalence of carcinoma. (Compare Figure 5, p. 245 and Table XV, p. 234.)

2. A larger number of autopsies in males than in females (ratio 3:2), when the number of beds for each sex is almost equal (329:305).

Dr. Stumpff, the director of our hospital, tells me that in the number of the deceased in the same period approximately the same ratio is found. In 11,202 deaths there were 5,406 males, 4,186 females, and 1,610 children (10 years and less). The ratio of males to females was 3:2.32. Evidently, the mortality of males in our hospital is higher than that of females.

I will not try to explain this peculiarity; if, however, we see in the tables the figures for carcinoma in general and carcinoma of the different organs in males and females, we must not forget the relation in the number of autopsies.

3. The number of the deceased and its relation to the number of autopsies gives one more problem. In the period 1910–1925 the number of deaths in our hospital has not been the same in each year; the numbers are given in Table V.

TABLE VI.—CANCER AT AUTOPSY BY YEARS AND ORGANS AND SEX. AMSTERDAM 1910–1925

Organs	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	Total	Grand Total
Stomach, m.	19	19	22	18	16	17	20	15	19	14	12	19	23	29	22	21	305	432
Stomach, f.	6	12	10	8	5	9	5	4	7	9	8	8	8	11	7	10	127	
Œsophagus, m.	10	9	11	7	8	9	5	8	6	12	10	11	6	7	10	7	136	152
Œsophagus, f.		2	4	1	1	2		1			1	2		1		1	16	
Intestine, m.	3	6	9	4	8	13	3	5	5	5	5	5	5	9	6	8	103	171
Intestine, f.	3	3	5	2	6	6	5	6	1	2	3	3	5	2	8	8	68	
Tongue, m.	2	4	1			3	2			2	1	4		3		1	23	23
Tongue, f.																		
Larynx, m.	3	2	1	2	5	2	2	4	1			1		2	2		27	28
Larynx, f.						1											1	
Uterus, f.	3	1	1	2	3	3	1	3	2	2			2		1	3	27	27
Breast, m.													1				1	49
Breast, f.	5	1	3	4	3		3	4	1	2	2	7	9	2		2	48	
Skin, m.											1				1		2	8
Skin, f.		1	1			1	1		1							1	6	
Bile ducts, m.			1	2		2			2	1		1	1	2	2		14	26
Bile ducts, f.	1	2	2	1		1		2			1	2					12	
Gall bladder, m.		3			2		1		2				2		1		11	53
Gall bladder, f.			1	5	3	1	5	1		2	4	5	4	4	2	5	42	
Liver, m.		1	1	2		1		2			1	1	2	1			12	18
Liver, f.			1		1			1			1		1			1	6	
Prostate, m.	6	3	2		2	2	2	1	2	2	4	3	3	6	3	3	44	44
Urinary bladder, m.	1	2	2	1	1	3			2	3			3	2	5	2	27	36
Urinary bladder, f.		1		1	1			1		1	2	1	1				9	
Ext. genitals, m.			1		1	2			1	1	1		1				8	9
Ext. genitals, f.									1								1	
Ovary, f.	3		1	1	1	1	2	2		1	1			2	1		16	16
Pancreas, m.	1	1	1		1			2		3	3	2	1	2	1		18	30
Pancreas, f.							1	1	2		1	3	1	1	1	1	12	
Kidney, m.		1						1		1	2					1	6	8
Kidney, f.												1		1			2	
Lung, m.		1		4	2	1		1		3	1	2	5	4	3	4	31	45
Lung, f.					1	2			2	1	2				3	3	14	
Mouth and pharynx, m.		1	3	2	1	2	4	3	1	3	1	3		2	1	2	29	32
Mouth and pharynx, f.			1							1						1	3	
Nose and sinuses, m.		1			1												2	5
Nose and sinuses, f.				1								1			1		3	
Thyroid, m.																		3
Thyroid, f.			1					1			1						3	
Totals	66	77	86	68	73	84	62	69	58	71	69	85	88	90	84	85	1,215	1,215

TABLE V.—NUMBER OF DEATHS IN RELATION TO AUTOPSIES

Year	Deaths	Autopsies	Per Cent.	Carcinoma	Percentage of Autopsies
1910	602	512	85	66	12.8
1911	620	539	87	77	14.3
1912	619	522	84	86	16.5
1913	598	471	89	68	14.4
1914	620	508	82	73	14.4
1915	708	591	83	84	14.2
1916	700	505	72	62	12.3
1917	857	566	66	69	12.2
1918	953	559	59	58	10.4
1919	822	578	70	71	12.3
1920	768	554	72	69	12.5
1921	700	518	74	85	16.4
1922	750	498	66	88	17.7
1923	642	428	67	90	21.0
1924	614	462	75	84	18.2
1925	629	484	77	85	17.4
	11,202	8,295	74	1,215	14.6

The numbers for carcinoma do not include 16 in which only metastases and no primary carcinoma has been found. (Compare Table VI).

The percentage of autopsies is rather high, compared with other hospitals in our country and in the United States.

Although the number and the distribution of the beds in our hospital have not changed in these years, we see in the second column an increase in the number of deaths in *war and postwar time*, that had its maximum in 1918, the year of the Spanish influenza. The number of autopsies in the third column, however, has not changed in an identical way, and does not exceed 578 (in 1919).

In the fourth column we see the result: the percentage of autopsies is varying in the successive years between 66 and 87 (in the year 1918, Spanish influenza, it was only 59 per cent).

Table VI. Note that autopsies in females are only as 2 is to 3 of the autopsies in males. The table indicates the total number as 1,215. This is not quite correct. Sometimes we see at autopsy two, rarely more, primary cancers, *e. g.*, cancer of the stomach and cancer of the skin. I have known 17 such cases; they appear twice in my table. There are other cases in which we are not sure whether there are two primary cancers, or whether there is only one with uncommon metastasis. For instance, we sometimes see two cancers of the œsophagus—both may be primary or one may be a metastasis of the other; cancer in both breasts—both may be primary or one may be a metastasis of the other; cancer of the tongue and the œsophagus, etc. I found 15 such doubtful cases; often it is difficult to evaluate such cases correctly. I will not discuss the problem of diagnosing double cancer here. The consequence, however, is that the total number of cancers in my table is 22 too high. Furthermore, we see cases with a few or a great number of metastases, but cannot find the primary tumor; all autopsy statistics have such "cancers with unknown primary localizations." I have seen 16 of these. Such cases have been omitted from my tables, so the total number is 16 too low. Double cancers and cancers with unknown primary localization together are the reason why the real number of cases is 1,225 − 22 + 16 = 1,219, which figure does not appear in my tables.

It is probable, at least possible, that in my laboratory no more than ±500 autopsies a year can be performed, at least in war and postwar time (for it is very small and inadequate), but there may be other reasons, although the capacity of our hospital has not changed at all, and the total number of patients treated in it every year has not changed much.[1]

It is probable that during and after the war patients of a somewhat different social position came in larger number to our hospital than before, because of financial difficulties, and it is possible that this constitutes a factor that tends to diminish the number of the autopsies. In consequence, we cannot be certain that my material in the successive years has always been identical.

Whatever the cause, it is evident that the percentage of autopsies, which was 80 and more before the war, has in some years been reduced to 66 or 67, and has not reached 80 again. (I exclude in this respect the year 1918 with only 59 per cent of autopsies.) I do not think that the influence of this factor upon the prevalence of carcinoma in autopsy has been important, but it may make a difference, and anyhow we cannot be sure, that the percentage of carcinoma in deaths *without* autopsy is the same as in deaths *with* autopsy, and it is certain that this factor influences the *total* number of cancer autopsies.

It is evident that, although the hospital and its number of beds for males and females have not changed in the years of my professorship, and although the same pathologist was the director of the pathological laboratory, we cannot be sure that the autopsy statistics of the successive years may safely be compared with each other: (*a*) because not *all* the deceased have been submitted to necropsy; (*b*) because the percentage of necropsies varies in the successive years between 66 and 87 per cent; (*c*) because we do not know whether the percentage of cancer in the cases submitted to autopsy is the same as in the cases not submitted to it.

There are still other arguments. In the period 1909–1925, the population of Amsterdam has increased and hospitals in other parts of the city have been

---

[1] This may be concluded from the number of days each patient has been in the hospital, whereof Dr. Stumpff gave me the figures shown in Table VII.

TABLE VII.

Year	Deaths	Number of days per patient
1909	636	38.87
1910	602	38.40
1911	620	36.91
1912	619	36.32
1913	598	35.76
1914	620	35.35
1915	708	41.84
1916	700	39.82
1917	857	41.95
1918	953	41.49
1919	822	43.40
1920	768	39.90
1921	700	35.00
1922	750	34.01
1023	642	34.51
1924	614	35.17
1925	629	34.59

enlarged; in consequence, we do not know whether the patients in our hospital represent the same proportion of the population in 1925 as they did in 1909. Furthermore, we do not know the exact influence of the Spanish influenza, the influence of the increase of tuberculosis during the war and immediately after it, nor the influence of the decrease of tuberculosis in the last years. For a hospital has a fixed number of beds; an increase in the number of non-cancerous patients must needs cause a decrease of cancer cases.

All these arguments must give us the conviction that a hospital population in a large city does not represent a definite part of the sick people in that city, and that the autopsies performed in that hospital on a varying percentage of the deceased do not represent a definite part of the mortality in that city.

If, therefore, we find at *autopsy*, that in some one year cancer is more frequent than in another year, it is not permissible to conclude there is a difference in the incidence of cancer in the city: *Increase or decrease of cancer in the postmortem room does not allow us to conclude that there is an increase or decrease of carcinoma in the city or in the country.* Peller's[1] opinion is the same.

It is necessary to lay stress on this conclusion, because in several autopsy statistics we find the conclusion that cancer is or is not increasing (Bejach, Bilz and others) and Rosenfeld[2] is right when he says: "Die Obduktionsstatistiker verfallen alle in denselben Fehler, dass sie die zufälligen Verhältnisse ihres Spitals als Spiegelbild von Bevölkerungsvorgangen auffassen." ("All autopsy statistics fall into the same error of regarding the accidental relations of their own hospital as a true reflection of the conditions of the population at large.") *The postmortem room does not give a true reflection of mortality in the city.*

This conclusion, however, does not necessarily exclude the possibility that postmortem examination gives us an indication that cancer in general, or a special form of cancer, is increasing or decreasing. Autopsies lead me to believe that lung cancer is increasing in recent years in Amsterdam, as well as they led me to believe in 1915 that it was more frequent in some German cities than in Amsterdam.

If, however, in a given period, postmortem examination could be performed on *all* the deceased in a city or in a country, we should *know* the prevalence of cancer as a cause of death in that period for that city or that country. I admit that this is impossible. However, this is the only way to get at the truth about cancer as *causa mortis*.

Bilz[3] tells us that when Prof. Mueller was professor of pathology in Jena, in some years 90 per cent of all the deceased in Jena were submitted to postmortem examination and that the average percentage was 77 per cent in these years. He does not give information on the incidence of cancer in Professor Mueller's time.

[1] Peller. Ztschr. f. Krebsforsch., 1925, xxii, 315.

[2] Rosenfeld. Kritik bisheriger Krebsstatistiken.

[3] Bilz. Ztschr. f. Krebsforsch.

At present autopsy is performed upon 27 per cent of the deceased inhabitants of Jena (upon 1,878 of 6,728 who died in the years 1910–1919).

Lubarsch[1] tells us that in approximately 5 per cent of the deceased in Germany autopsy is performed, and I think that in Holland the percentage is lower. The conditions in Jena are very favorable indeed. It is evident, however, that even a percentage of autopsies amounting to 27 per cent of all the deceased does not warrant a conclusion regarding the real prevalence of carcinoma as *causa mortis*.

Yet it is not without interest to add Bilz's statistics and also another Amsterdam autopsy table to my own table, Table VIII.

TABLE VIII.

	Bilz	Amsterdam (Binnen-Gasthuis)	Amsterdam (Wilhelmina-Gasthuis)
Stomach	207	432	263
Œsophagus	72	152	57
Intestine	123	171	142
Mouth and pharynx	31	32	22
Tongue	6	23	14
Larynx	14	28	5
Uterus	66	27	231
Breast	13	49	61
Skin	9	8	12
Bile ducts and gall bladder	20	79	56
Liver	3	18	6
Prostate gland	20	44	31
Urinary bladder	19	36	26
External genitals	13	9	21
Ovary	11	16	38
Pancreas	13	30	20
Kidney	19	8	6
Lung	18	45	30
Nose and sinuses		5	6
Thyroid	5	3	2
*Peritoneum	4		
*Testis	3		
*Brain	1		
*Hypophysis	1		
*Sphenoid	1		
*Bronchiogenic	1		
*Mediastinum	1		
*Suprarenal gland	1		
*Orbit	1		
Pleura	1		
Seminal vesicle	1		1
Unknown or uncertain	2	16	11
Total	700	1,231	1,061

* Carcinomata of the organs marked with an asterisk are not mentioned in the Amsterdam statistics for various reasons.

I am very thankful to Dr. Anne Scholte, assistant to Prosector Dr. E. Hammer in the Wilhelmina-Gasthuis, for the many hours and the great care she spent in composing the autopsy table of the Wilhelmina-Gasthuis.

---

[1] Lubarsch. Med. Klin., 1924.

I am not going to make a comparison between these three enumerations or to draw conclusions from the comparison. It is easy to find many differences; it is more important, however, to know the difference between the *hospitals*.

In the beginning of my paper I described the particulars of the Binnen-Gasthuis as a general hospital in the oldest part of our city, used for medical teaching and lacking wards for infectious diseases, psychiatry, ophthalmology, gynecology, and obstetrics.

The Wilhelmina-Gasthuis is a general hospital in the newer part of the city; it is not a university hospital, but it contains the university clinics for obstetrics and gynecology, for psychiatry and ophthalmology, and it has large wards for infectious diseases; these particularities explain the lower percentage of carcinoma (10 per cent against 14.7 per cent in the Binnen-Gasthuis), the large number of cases of cancer of the uterus and ovary, and the lower number of cancer of the larynx the reason for this being that the laryngological clinic is in the Binnen-Gasthuis.

Bilz's statistics concern the cancer cases in the pathological institute of the University of Jena. Jena is a small German university town; only 121 of the 700 cancer cases are from Jena, 499 are from the country around Jena,[1] and 40 concern soldiers in war time. It is evident that the three hospitals differ from one another in such a high degree that it is useless to analyze the differences in their autopsy tables, in order to learn the prevalence of cancer. So in my opinion Bilz is wrong when he compares his statistics with these of Bejach and Redlich, both from the laboratory of Benda in Berlin.

I come to the end of my argument.

I began by pointing out that we must be very careful in comparing the different years of my own autopsy table; I have tried to explain how careful we must be in drawing conclusions from autopsy statistics as to the prevalence or the increase or decrease of cancer, and I ended by demonstrating the uselessness of comparing the three autopsy tables of Bilz, myself, and Dr. Scholte. We must be very careful in using autopsy statistics for studying cancer incidence; we are not justified in generalizing the particulars and peculiarities of the hospital, as Rosenfeld says autopsy statisticians are inclined to do. Indeed, in my opinion we may draw conclusions concerning the prevalence of cancer from the comparison of autopsy statistics if we regard these conclusions as "working hypotheses," that must be corroborated by further investigations.

We must not conclude, however, that autopsies have no value for our knowledge of the prevalence of cancer; on the contrary, they form the most important factor for the estimation of the value of mortality returns; they teach us how to correct the errors of the latter in so far as this is possible; they teach us how we must read these returns, and they show us how we can try to avoid at least some of these errors in the future.

---

[1] I cannot give the corresponding number for the Binnen-Gasthuis. Dr. Stumpff tells me that among about 7,000 lying-in patients in the Binnen-Gasthuis in one of the most recent years, there were only 135 who did not have their residence in Amsterdam.

II. MORTALITY RETURNS

The last report of the Statistical Bureau of the Netherlands for the years 1923 and 1924 begins its chapter on the mortality of cancer and other malignant tumors as follows:

"Carcinoma, along with other malignant tumors, is, next to tuberculosis, the cause of death that had the largest number of victims. In 1923, 11.42 per cent, and in 1924, 11.43 per cent, of the total mortality in our Kingdom was caused by carcinoma and other malignant tumors. The average mortality figures are steadily increasing, until at present it stands first on the list of the causes of death."

In these few words the importance of cancer as a cause of death for our country is shown. It is as clearly demonstrated in a diagram of cancer mortality from 1867 to 1924, showing the annual number of deaths from cancer per 10,000 living inhabitants of our country. The cancer death rate of 3.4 per 10,000 in 1867 has increased to 11.2 per 10,000 in 1924.

Of a population of about 7,000,000 in 1923, there were registered, 8,105, and in 1924, 8,133, deaths from cancer.

A. Increase of Cancer in Mortality Returns

Autopsy tables show that we must be cautious about the accuracy of mortality returns. Before discussing this subject, however, I want to say a word on the alleged increase of cancer.

We all know that, according to mortality returns, cancer is increasing; only it is questionable whether the increase of the figures in the mortality tables corresponds with a real increase of cancer—whether this increase is real or only apparent.

There are two principal arguments for the assertion that the increase of cancer is only apparent.

First, it is said that man reaches a greater age now than formerly, and that as cancer is a disease of the later years of life, it must be more frequent than formerly; in this way the increase of cancer would be only the consequence of prolongation of life; if man dies before he reaches the cancer age, he will not die of cancer.

Second, it is said that cancer is now diagnosed more frequently than formerly, because of the improvement in our knowledge of cancer. For instance, whereas death was formerly attributed to old age, to marasmus, today some of such cases are correctly diagnosed as cancer.

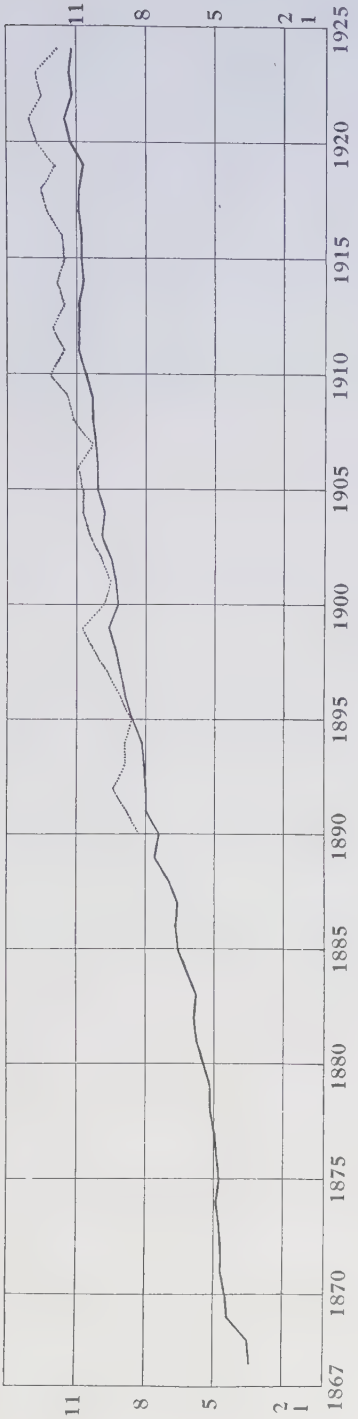

Fig. 1. Cancer in the Netherlands 1867–1924 ——; cancer in Amsterdam, 1890–1924 ...., per 10,000 living inhabitants. (After the mortality tables of the Statistical Bureau in the Netherlands.)

The influence of man's reaching a greater age than in former years, and the influence of more accurate diagnosis might perhaps afford an explanation of the increase of cancer, as we see it in mortality returns; at least some authors say so.

As yet, it is rather difficult to appreciate correctly the influence of these factors; in my opinion they do not suffice to explain the statistical increase. I will give some of the grounds for my belief, being well aware, however, that I may not convert those who think otherwise.

In the first place, I draw your attention to the diagram (Fig. 1) of cancer mortality in the Netherlands according to the Reports of the Statistical Bureau of our Kingdom. We see that from 1867 cancer mortality has been steadily increasing. It is very far-fetched, in my opinion, to explain this curve by improvement in diagnosis.

The American statistician Hoffman[1] tells us that Walshe, in commenting upon a table of mortality from cancer in London for the years 1728–1838, wrote as follows: "From this, it would at first view appear that the frequency of the disease had been steadily increasing during the last hundred years; but the real causes of the augmented ratio are more likely to be the decrease of mortality from epidemic diseases and the greater accuracy of diagnosis as respects carcinomatous affections."

In 1844 the increase of cancer was explained away in the same way as it is at present.

I cannot refrain from copying the table in question (Table IX, p. 228) from Hoffman's important treatise.

---

[1] Frederick L. Hoffman. The Mortality from Cancer throughout the World, 1915, p. 29.

TABLE IX.—MORTALITY FROM CANCER IN LONDON, 1728–1838
(After Hoffman)

	Proportion of deaths from cancer in every 1,000 deaths
1728–1757 (30 years)	2.0
1771–1780 (10 years)	3.4
1831–1835 (5 years)	4.4
June 30, 1837, to Dec. 31, 1838 (18 months)	6.1

Cancer in Holland according to mortality returns is at present 114 per 1,000 deaths.

It would be important to know whether clinical diagnosis of carcinoma is really more accurate now than in former years, and if it is improving regularly; only then could improvement in our diagnostic facilities be used to explain an "apparent" increase of cancer. The only publication I could find relating to this question is Lex's *Dissertation* (Heidelberg, 1909) on cancer statistics. Lex studied the autopsy protocols in Heidelberg from 1841 to 1908; in the beginning autopsies were rare, in some years there were none. He gives the following table (Table X), showing the frequency of cancer at autopsy:

TABLE X.

1860–1869	7.94 per cent
1870–1879	6.57 per cent
1880–1889	7.40 per cent
1890–1899	9.00 per cent
1900–1907	9.13 per cent

As I have pointed out above, the increase in the figures shown in the autopsy table does not justify the conclusion that there has been an increase in frequency of cancer.

In the last 26 years clinical diagnoses have rather often ("ziemlich regelmässig") been confirmed in the autopsy protocols. The writer makes a comparison between the correctness of clinical diagnosis in the periods 1882–1894 and 1895–1907.

In the period 1882–1894, 214 of 302 carcinomata were correctly diagnosed (70.2 per cent).

In the period 1894–1907, 410 of 593 carcinomata were correctly diagnosed (69.1 per cent).

We see that about an equal percentage of the cancer cases have been correctly diagnosed in these two periods. This holds good also for carcinoma of different organs. Cancer of the stomach has been correctly diagnosed in 73 cases, 73.7 per cent; cancer of the colon in 60 cases, 67.5 per cent; cancer of the œsophagus in 87.8 cases, 79 per cent; cancer of the larynx in 100 cases, 87.5 per cent. The result is that accuracy of clinical diagnosis has not perceptibly changed. (We must never forget, however, that these diagnoses relate to patients whose disease has ended in death; it is not disproved that diagnosis of *early* stages of cancer has improved, and this indeed is very probable and in some forms of cancer undeniable.)

Concerning the influence of the fact that man reaches a higher age now than in former years, I only want to say that our statistician, Prof. Verryn Stuart, and also Prof. Deelman do not accept this as a cause for the increase of the figures in the mortality returns.

So I am inclined to believe in a slow and steady increase of cancer in general, which increase is very much in need of a methodical and accurate analysis. We must try to ascertain the course of the different forms of cancer in order to make sure whether they are growing, diminishing, or remaining stationary. Later on, I want to say a few words on the course of some forms of cancer.

B. The Value of Mortality Returns

What is the value of mortality returns?

As a pathologist, I look at the mortality returns with the eye of the pathologist and I want to consider the importance of autopsy and autopsy statistics in valuing them.

Cancer of the liver. In the contribution of van Konijnenburg *Mortalité par Cancer* in the publications of the Statistical Bureau of Amsterdam, 1911, we find a table for the principal forms of cancer in the period 1897–1902. This table runs as follows:

TABLE XI.

Males		Females	
Mouth and pharynx	60	Mouth and pharynx	7
Œsophagus	159	Œsophagus	31
Stomach	613	Stomach	464
Intestine	137	Intestine	148
Liver	133	Liver	242
		Uterus	317
		Breast	158

I show this table because the number of carcinomata of the liver is separately mentioned; in the Reports of the Statistical Bureau of the Netherlands we find this form of cancer under the heading "cancer of the stomach, liver, etc."

If we compare such a mortality table with my own (Table I, p. 218) or any other autopsy table (those of some tropical regions excepted), we find that the latter show only a very few cases of cancer of the liver, while in the mortality table we find a large number of this form of cancer.

The explanation is very simple: most cases of cancer of the liver are secondary; the primary cancer that caused the metastases in the liver is rather often *not* found by clinical examination, and is generally found at autopsy; therefore such cases appear in the mortality tables as cancer of the *liver*, and in the autopsy tables as cancer of the *primarily affected organ* (stomach, œsophagus, bile ducts, uterus, etc.).

Clearly the mortality tables are wrong concerning cancer of the liver, and in those tables where stomach, œsophagus, and liver are found under the same heading "stomach and liver," the number must be regarded as too high; the error is rather important, as a comparison of the figures of Konijnenburg's table and mine shows.

The existence of this error is very well known, and its importance should be made clear by placing "carcinoma of the liver" under a separate heading in mortality returns.[1] However, we can not as yet correct this error; we know very well that most of these cases are not true cancer of the liver, but without performing a postmortem examination we cannot place them under their correct heading; this group certainly contains many cases of cancer of the stomach, œsophagus, bile ducts and gall bladder, intestine, etc., but we are ignorant of the number of each.

The consequence is that in mortality tables not only is the figure for cancer of the liver wrong, but also the figures for other organs; this is not the only cause of errors in mortality returns, as may be demonstrated by a closer inspection of mortality and autopsy tables, in relation to accuracy of clinical diagnosis.

III. ACCURACY OF CLINICAL DIAGNOSIS

In the reports of the autopsies in my laboratory, the clinical diagnosis is noted if the case in question has been diagnosed. Sometimes there is no clinical diagnosis: sometimes the diagnosis is followed by an interrogation point.

I have compared clinical and anatomical diagnoses in my cancer cases, and I have tried in every case to form an opinion as to whether the clinical diagnosis has been correct or incorrect. This is not so easy as it seems. If a cancer of the stomach is diagnosed as such, or if we find at autopsy a cancer of the stomach when a peptic ulcer has been diagnosed, there is no difficulty in seeing that the first diagnosis was right and the second was wrong. But what are we to do if cancer of the cardia is diagnosed as cancer of the œsophagus (by its localization) or as cancer of the liver (by its metastases) or as lymphosarcoma (by its metastases in the retroperitoneal glands)?

As my principal object has been to form an opinion on the value of mortality returns in relation to the total number of cancer cases, and as mortality returns are the outcome of clinical diagnosis, generally not controlled by autopsy, I have regarded these three (really wrong) diagnoses as correct, because such a case, controlled or not controlled by autopsy, would appear in the mortality returns as a malignant tumor. On the other hand, if a person who has a cancer of the stomach (found at autopsy) should die of apoplexy, I have regarded the diagnosis of apoplexy (really right) as wrong, because such a case would not appear as a cancer case in mortality returns. I have distinguished the following three groups:

---

[1] Peller (loc. cit., p. 333) recommends placing cancer of stomach, liver, and gall bladder together under the same heading. This is not my opinion.

1. *Diagnosis correctly made*, if the primary tumor or its metastases have been diagnosed as cancer or malignant tumor.

2. *Diagnosis wrongly not made*, when a cancer, found at autopsy, has not been diagnosed *in vivo* as a cancer or a tumor ("omissions," according to Gideon Wells.[1])

3. *Diagnosis wrongly made*, when cancer has been diagnosed and autopsy fails to reveal a cancer or other malignant tumor ("commissions," according to Gideon Wells.[1])

Gideon Wells says that diagnosis of cancer may be correct, or there may be omissions, or there may be commissions. (Compare page 237.)

In most of my autopsy cases diagnosis has been correct in the sense mentioned above, and a great many of them have been strictly correct as to primary localization.

However, there is a considerable percentage in which cancer diagnosis has been wrongly made, or wrongly not made. Among my 1,249 cases of cancer there have been 249 (20 per cent) in which cancer has not been diagnosed. The cause of the error was not always the same; sometimes the tumor was very small and had not given any symptoms; sometimes death was caused by other more conspicuous diseases or complications, for instance, by apoplexy or by hæmatemesis; sometimes the patient was brought to the hospital dying; in most cases it is easy to understand why cancer has not been diagnosed. However, the fact remains that 1,000 of 1,249 cancers existing in 8,500 autopsies were correctly diagnosed and 249 were not. This means that if no autopsy had been performed, only 1,000 cases would have appeared in mortality returns; this error is 249 in 1,000 cancers, or 25 per cent.

It is true, however, that cancer has not been the cause of death in all these cases.

We might suppose that this error in mortality returns caused by carcinoma wrongly not diagnosed (omissions) might be offset by the error caused by carcinoma wrongly diagnosed (commissions).

In 8,500 autopsies there were 102 cases in which cancer was diagnosed, but no cancer or tumor found at autopsy; here I have not taken into account the doubtful cases (for example, clinical diagnosis, "carcinoma or gumma hepatitis"), nor those tumors that are probably not carcinomata (tumor cerebri). I counted, however, tumor abdominis and tumor intestini, because then a *carcinoma* is supposed.

---

[1] Gideon Wells. Relation of clinical to necropsy diagnosis in cancer, etc., J. Am. M. Ass., 1923, lxxx, 737.

The list of these cases runs as follows:

TABLE XII.—CANCERS OR TUMORS BY CLINICAL DIAGNOSIS NOT FOUND AT AUTOPSY

Cancer of stomach	34
Cancer of liver	8
Cancer of intestine	15
Cancer of gall bladder	3
Carcinoma viscerale	4
Carcinoma occultum	4
Cancer of prostate gland	3
Cancer of uterus	4
Cancer of larynx	3
Cancer of lung	2
Cancer of urinary bladder	6
Cancer of œsophagus	5
Tumor abdominis	4
Cancer of glands	1
Cancer of pancreas	1
Cancer of mouth	1
Metastatic carcinoma	1
Metastatic carcinoma of spine	1
Cancer of ovary	1
Cancer of thyroid	1
Total	102

TABLE XIII.—LOCATION OF CANCERS NOT DIAGNOSED CLINICALLY

					Per Cent.
Cancer of stomach	in	80	of	445	18.0
Cancer of œsophagus	in	26	of	154	16.7
Cancer of intestine	in	39	of	175	28.0
Cancer of tongue	in		of	23	
Cancer of larynx	in		of	28	
Cancer of uterus*	in	9	of	28	32.0
Cancer of breast	in	2	of	52	3.8
Cancer of skin	in		of	9	
Cancer of bile ducts	in	19	of	104	18.0
Cancer of gall bladder	in				
Cancer of liver	in				
Cancer of prostate	in	33	of	91	36.6
Cancer of urinary bladder	in				
Cancer of external genitals	in				
Cancer of ovary	in	4	of	17	23.5
Cancer of pancreas	in	9	of	30	30.0
Cancer of kidney	in	3	of	8	37.5
Cancer of lung	in	22	of	45	49.0
Cancer of mouth and pharynx	in		of	32	
Cancer of nose and sinuses	in	1	of	5	20.0
Cancer of thyroid	in	2	of	4	50.0
		249	of	1,249†	19.9

*The large number of cancers of the uterus not recognized may be explained by supposing that the easy cases are sent to the Wilhelmina-Gasthuis, where the gynecologic clinic is situated. Only cases not recognized by the general practitioners in the city come accidently to our hospital.

†The number of cases is 1,243, the number of localizations 1,249, because of carcinoma duplex and carcinoma with unknown primary localization (Table XV, p. 234).

Conclusion. In 8,500 autopsies (1,249 carcinomata), 1,000 cancers have been correctly diagnosed, 249 have been wrongly not diagnosed (omissions), and 102 have been wrongly diagnosed (commissions). If in all these cases, autopsy had *not* been performed, the clinical diagnosis would have been "cancer" in

TABLE XIV.—CANCER AT AUTOPSY BY ORGANS AND SEX
AMSTERDAM, 1910–1925

	Males Per Cent.	Females Per Cent.	Both sexes Per Cent.
Stomach	305=38.1	127=30.5	432=35.6
Œsophagus	136=17	16= 3.8	152=12.5
Intestine	103=12.9	68=16.3	171=14.1
Tongue	23= 2.9		23= 1.9
Larynx	27= 3.4	1= 0.2	28= 2.3
Uterus		27= 6.5	27= 2.2
Breast	1= 0.1	48=11.5	49= 4.0
Skin	2= 0.2	6= 1.4	8= 0.7
Bile ducts	14= 1.7	12= 2.9	26= 2.1
Gall bladder	11= 1.4	42=10.1	53= 4.4
Liver	12= 1.5	6= 1.4	18= 1.5
Prostate	44= 5.5		44= 3.6
Urinary bladder	27= 3.4	9= 2.2	36= 3.0
Ext. genitals	8= 1	1= 0.2	9= 0.7
Ovary		16= 3.8	16= 1.3
Pancreas	18= 2.2	12= 2.9	30= 2.5
Kidney	6= 0.7	2= 0.5	8= 0.7
Lung	31= 3.9	14= 3.4	45= 3.7
Mouth, etc	29= 3.6	3= 0.7	32= 2.6
Nose and sinuses	2= 0.2	3= 0.7	5= 0.4
Thyroid		3= 0.7	3= 0.2
Total	799	416	1,215

Table XIV. Cancer at autopsy. This table gives the total figure for each organ in males, in females, and in males and females together, with their incidence per 100 cancers in the period 1910–1925.

1,249 − 249 + 102 = 1,102 cases. To these 1,102 cases, 147 would have to be added to obtain the correct number of cancers (1,249) observed in 8,500 autopsies.

If in general practice the average error in diagnosis should be the same as in our hospital, the prevalence of cancer in general as shown by mortality returns must be enlarged by 147 on 1,102 cases—13.3 per cent.

Of course this supposition is not admissible. I think, however, that we may be allowed to say that *carcinoma is more frequent than is shown in mortality returns.*

Table XII shows which forms of cancer have been wrongly diagnosed in 8,500 autopsies. The next table (Table XIII) shows the localization of those cancers that have not been found in clinical examination (omissions).

I shall not mention all the different diseases that may be diagnosed as cancer; among them we find carcinoma recti diagnosed for diverticula, carcinoma hepatis for hepar lobatum syphiliticum, carcinoma of vertebra for tuberculosis of the spine, etc. It is easy to understand how these wrong diagnoses may occur. In relation to cancer statistics, however, it is to be considered that in these wrong diagnoses precisely those localizations predominate in which diagnosis of carcinoma is difficult; for example, we find here 34 cases of carcinoma of the stomach, 15 of the intestine, but only 5 of the œsophagus, 1 of the mouth, and none of the breast. The consequence is that these wrongly diagnosed cancers (Table XII)

TABLE XV.—CANCER AT AUTOPSY BY AGE AND ORGANS AND SEX IN 8,500 AUTOPSIES AMSTERDAM, SEPTEMBER, 1909–FEBRUARY, 1926

Organs	Males Ages 21–30	31–40	41–50	51–60	61–70	71–80	81–	?	Total	Females Ages 21–30	31–40	41–50	51–60	61–70	71–80	81–	?	Total	Both Sexes Total
Stomach	3	14	44	75	111	58	9	3	317	2	11	18	26	32	30	8	1	128	445
Œsophagus			22	49	49	13	3	2	138		2	3	2	4	3	1	1	16	154
Intestine	1	7	10	23	36	23	3	3	106	2	4	4	13	25	15	4	2	69	175
Tongue			1	6	6	9	1		23										23
Larynx		2	2	5	13	4		1	27					1				1	28
Uterus											3	5	8	6	3	2	1	28	28
Breast						1			1		3	11	21	7	7	1	1	51	52
Skin			1			1			2		1			2	3	1		7	9
Bile ducts and gall bladder			3	8	9	5	2		27	1	1	7	14	17	13	5		58	85
Liver	1		2	2	3	3		1	12				4	2				6	18
Prostate			2	2	17	18	7		46										46
Urinary bladder			1	6	13	4	2	1	27				4	4	1			9	36
Ext. genitals		1	1	2	3	1			8					1				1	9
Ovary										1		5	7	3		1		17	17
Pancreas		1	1	5	10	1			18		1	1	2	4	3	1		12	30
Kidney				2	2	2			6					2				2	8
Lung	1	5	7	8	9	2			32	1			4	4	3	1		13	45
Mouth and pharynx		1	6	5	9	7		1	29			1	2					3	32
Nose and sinuses					2				2			1	1		1			3	5
Thyroid				1					1		2				1			3	4
Total	6	31	103	199	292	152	27	12	822	7	28	56	108	114	83	25	6	427	1249
Number of autopsies	416	488	639	924	901	511	111			297	304	412	490	550	414	152			
Percentage	1.5	6.4	16.1	21.5	32.9	29.5	24.3			2.4	9.2	13.6	22	20.7	19.8	17.1			

Percentage—0–40 years: 37 in 1,929 autopsies = 1.4 per cent.
Older than 40 years: 373 in 3,097 autopsies = 25 per cent.

Percentage—0–40 years: 35 in 1,311 autopsies = 2.7 per cent.
Older than 40 years: 386 in 2,018 autopsies = 19.1 per cent.

Number of autopsies:

0–40 years males	1,929
0–40 years females	1,311
41– years males	3,097
41– years females	2,018
Age unknown	145
Total	8,500

have a varying influence on the figures for the localizations of cancers in mortality returns. They raise the figures of some localizations, such as cancer of the stomach, where diagnosis is difficult, but have no influence on the figures of external cancers (skin, lip, tongue, and breast).

Table XIII, (p. 232) shows us another well known fact which influences the accuracy of mortality tables. In this table we see that some carcinomata are always correctly diagnosed (of tongue, larynx, breast) and other carcinomata are very often not diagnosed (pancreas, lung, prostate).

We see that carcinoma of the lung is "correctly" diagnosed in 51 per cent, carcinoma of prostate, etc., in 64 per cent, carcinoma of pancreas in 70 per cent, carcinoma of stomach in 82 per cent, etc. This means that the last mentioned cancers are really more frequent than is presumed in clinical observation, and the result is again that the mortality tables differ in an irregular way from the *real* mortality of cancer.

The consequence of all these factors is that the *commissions* tend to raise the number of some rather frequent cancers that are difficult of diagnosis (stomach, intestine), that the *omissions* diminish not only the number of some frequent cancers (stomach, intestine, œsophagus), but also the number of "other forms" (prostate, pancreas, lung) and that neither (perceptibly) changes the number of external cancers.

In my opinion no estimation of the percentage effect of "omissions and commissions" on mortality tables is permissible, because, as I pointed out in the first section, the autopsies in a hospital do not form an adequate record of the deceased in the city where the hospital is situated.

We may be permitted to suppose, however, that the errors in general practice are of the same nature as in hospital practice. I do not care to make a guess whether or not a higher percentage of errors is made in hospital practice than in general practice; at first glance it would seem that hospital practice would give fewer errors, because of the greater opportunity for accurate clinical observation. We must not forget, however, that it is especially the difficult cases that go to the hospitals. So I will not venture beyond the supposition that errors in hospital practice and in general practice are of the same nature. In this way, autopsies teach us the influence (in quality, not in quantity) of errors in diagnosis.

In the literature we find some publications on the relation between clinical and postmortem diagnoses. The views of the authors as to the effect of omissions and commissions on the total number of cancer cases in mortality returns confirm

---

Table XV. Cancer at autopsy by age, organ, and sex in 8,500 autopsies. Total 1,249. Here again 22 may be subtracted for double cancer, and 16 may be added for cancer with unknown localization. The table also shows the incidence at autopsy in my laboratory up to the age of 40 years, and at 41 years and more.

my opinion that autopsy does not allow any estimation of the errors in *general* practice, or of their influence on the accuracy of mortality returns.

Rittershaus[1] finds 440 cancers in 4,719 autopsies; 48 (10.91 per cent) had not been diagnosed; in 13 cases cancer had been wrongly diagnosed (2.87 per cent of 440 = 13 cases). He reduces this percentage by closer inspection of his cases to 2 per cent. His conclusion is that 10.91 − 2, or 8.91 per cent, are lost for the statistician by these errors.

A glance at his table shows, as the principal difference from mine, the fact that the number of *external* cancers is relatively larger than in mine, which may explain the difference between our figures (I found 20 per cent omissions).

He mentions Riechelmann's[2] publication (Riechelmann found that of 711 cancer cases diagnosed at autopsy, 156, or 21.94 per cent, had not been diagnosed clinically) and concludes that there are more cases of cancer than are mentioned in medical and clinical statistics. At the end of this publication he reduces this percentage to 13.78, because in his series of autopsies 58 cases of cancer had been wrongly diagnosed; he subtracts these from 156 omissions and the result is 98, or 13.78 per cent.

Rittershaus is cautious and attributes the difference between his figures and Riechelmann's to the small number of their cancer cases. He thinks that a more correct idea of the degree of these errors might be attained, if we knew the autopsy tables of all the institutes of pathology in Germany.

His wish is about to be realized. In 1924 Lubarsch[3] published the result of an investigation on cancer at autopsy, which comprised all the cases found at autopsy in all the laboratories of pathology in Germany (those of two towns excepted). The result is given in Table XVI for 1920.

TABLE XVI.—STATISTICS FROM LABORATORIES OF PATHOLOGY IN GERMANY

Autopsies in German Laboratories, 1920	Mortality returns of Germany, 1920
Number of autopsies....................40,937	Number of deaths......................922,350
	(Stillborn infants excluded.)
Males 21,379 = 52.22 per cent	Males 457,736 = 49.63 per cent
Females 19,493 = 47.6 per cent	Females 464,614 = 50.17 per cent
Number of carcinomata......3,708 = 9.2 per cent	Number of carcinomata....52,476 = 5.68 per cent
Males 1,881 = 8.8 per cent	Males 22,818 = 4.98 per cent
Females 1,827 = 9.37 per cent	Females 29,858 = 6.38 per cent

He concludes that mortality returns bring to our knowledge *only a little more than half the real number* of cancer cases.

In my opinion this conclusion is *not warranted*, as I pointed out just now. Lubarsch also gives a table (Table XVII) of omissions and commissions, distinguishing between external and internal cancers.

---

[1] Rittershaus. Fehldiagnosen bei Carcinom. Dissertation Bonn, 1904.

[2] Riechelmann. Berl. klin. Wchnschr., 1902, xxxix, 728.

[3] Lubarsch. Med. Klin., 1924.

TABLE XVII.

External cancers (skin, mucosæ)		Internal cancers	
Clinical diagnosis cancer	1,346	Clinical diagnosis cancer	6,080
No cancer at autopsy 4 = 0.30 per cent		No cancer at autopsy 159 = 2.67 per cent	
Anatomic diagnosis cancer	1,411	Anatomic diagnosis cancer	7,164
Cancer not diagnosed 69 = 5.00 per cent		Cancer not diagnosed 1,243 = 17.35 per cent	
Cancer diagnosed but wrongly localized 46 = 5.26 per cent		Cancer diagnosed but wrongly localized 1,081 = 15.09 per cent	

Lubarsch says that mortality returns that are not based on autopsies made by experienced men have *very little value;* in my opinion his view is too pessimistic, as I shall point out later on.

Lung cancer (450 cases, 5.4 per cent) was not diagnosed in 53 per cent. In 109 cases not even an affection of the thoracic organs had been suspected.

Gideon Wells[1] studied the accuracy of clinical cancer diagnosis in 3,712 autopsies with 545 "malignant diseases" (glioma, endothelioma included). Of these, 178, or 32.66 per cent, had not been diagnosed.

In 33 cases cancer was diagnosed but was found absent at autopsy; in 545 − 178 + 33 cases, cancer had been diagnosed = 400 cases. So the actual number of malignant diseases found at autopsy was 36 per cent more than had been diagnosed.

In Wells' opinion, his study "shows emphatically the lack of value of all recorded vital statistics on cancer. When we find diagnostic errors ranging from 25 to 40 per cent in patients who have been examined in modern hospitals in Germany, England, and America, with the advantage of exploratory operations, roentgen rays and laboratory studies under the most competent medical men in the community, it is certain that the diagnostic errors made throughout the country at large must be even greater. To be sure, to the large charity hospitals come an excessive proportion of patients too near to death for careful study, and there come to necropsy an undue proportion of cases that are difficult of diagnosis." At the end of his paper, he says: "We shall have no exact and very little useful information concerning cancer statistics until a very much larger proportion of vital statistics depends on postmortem examination than is now the case."

We see that Wells' view is almost as pessimistic as that of Lubarsch.

Bilz[2] (Jena) has a more favorable opinion. He mentions the publications of Rittershaus and Riechelmann, also those of Hoffmann and Lex.

In Hoffmann's statistics 168 of 857 carcinomata had not been diagnosed (21.94 per cent).

In Lex's statistics the percentage was 29.8 in the period from 1882 to 1894 and 30.9 from 1895 to 1907.

Bilz then says about his own tables: "Als Gesammtergebnis fand ich, dass in 660 von 700 Fällen, also in 94.28 prozent, eine klinische Diagnose gestellt war.

---

[1] *Loc. cit.*

[2] Bilz. Ztschr. f. Krebsforsch.

"Von diesen 660 klinischen Diagnosen waren in Bezug auf den Krebs 528 = 80 prozent vollkommen richtig, 72 = 10.91 falsch gestellt, während in 60 Fällen = 9.09 prozent das Carcinom überhaupt nicht erkannt war. Das ist ein wesentlich anderes Resultat, als es Hoffmann, Riechelmann, Lex, aufzuweisen haben." ("As a total result, I found that in 660 of 700 cases, that is, 94.28 percent, a clinical diagnosis had been made. Of these 660 clinical diagnoses, 528, or 80 per cent, were correct, 72, or 10.91 per cent, were erroneous, while in 60, or 9.9 per cent, a carcinoma that was present had not been diagnosed. This is an essentially different result from that to which Hoffmann, Riechelmann, and Lex have pointed.")

Here the percentage of error seems to be less: 80 per cent had been correctly diagnosed, 10.91 per cent were erroneous. But, if we arrange the facts in another way, the result is almost the same in my statistics and those of others. For in Bilz's 700 carcinomata, 528 had been correctly diagnosed. If the autopsy had not been performed, only 528 cases would have appeared in the mortality returns, and 172 would not. In 700 carcinomata there were, therefore, 25 per cent of errors. In 528 clinical diagnoses there were 32.6 per cent of errors.

Cancers of the different organs give a closely analogous result (Table XVIII).

TABLE XVIII.

Carcinoma of lung	diagnosis correct in	11 of	18 cases
Carcinoma of larynx	diagnosis correct in	14 of	14 cases
Carcinoma of pancreas	diagnosis correct in	1 of	12 cases
Carcinoma of tongue	diagnosis correct in	6 of	6 cases
Carcinoma of prostate	diagnosis correct in	11 of	20 cases
Carcinoma of bladder	diagnosis correct in	16 of	19 cases
Carcinoma of gall bladder and bile ducts	diagnosis correct in	13 of	19 cases
Carcinoma of stomach	diagnosis correct in	168 of	207 cases

In my opinion there is no important difference between Bilz's statistics, the other autopsy statistics, and my own; only their valuation differs.

We see that the opinions regarding the value of errors in *hospital* practice show a considerable variation. How shall we conclude from them the percentage of errors in *general* practice? In my opinion this can not be done, but we may suppose that the general practitioner errs in the same manner as the hospital doctor.

IV. DISCUSSION

We must conclude that for several reasons mortality returns cannot be considered as correct:

A. Most cases of cancer of the liver are secondary and belong to other localizations, in proportions which are not known.

B. The total number for cancer is erroneous.

1. Cancer wrongly not diagnosed (omissions) must be added.
2. Cancer wrongly diagnosed (commissions) must be subtracted.

C. The figures for external cancers in mortality tables are probably approximately correct. The figures for some internal cancers (lung, prostate, pancreas) are surely quite wrong, but the degree of the error is unknown.

The result of all these considerations *might* be formulated like this: Carcinoma is very frequent. Some organs are more often attacked by this disease than others; exact numbers are missing. Postmortem examination in a hospital does not allow a conclusion regarding the prevalence of cancer in city or country. Mortality returns are erroneous.

But if I expressed my opinion in this way, I should be very ungrateful and very unfair. Mortality returns and autopsies *have taught us a great deal*, and they will teach us more, if we follow the way of research they show us.

What have they taught us?

1. The postmortem room shows that cancer is more frequent than mortality returns indicate.

2. The postmortem room also shows us that the important carcinomata of internal organs (stomach and intestine) are probably more frequent than the clinical diagnoses (both those correctly and those wrongly made) indicate, and are, in consequence, probably more frequent than mortality tables indicate.

Conclusion. Mortality tables give too favorable an impression of the prevalence of carcinoma of these organs.

3. The postmortem room shows us that cancer in some organs is almost always correctly diagnosed when the patient dies of his tumor; cancer of lip, tongue, mouth, skin, breast belong to this group.

Conclusion. Mortality tables are to be trusted regarding these cases.

We may conclude that regarding these cancers the mortality returns may be trusted, and that we can study them in relation to the increase or decrease of these forms. So I think that cancer of the breast is really increasing in our country according to Prof. Methorst's[1] communication in the Report of the League of Nations, and that it is stationary in Amsterdam according to Deelman's article[2] in the *Revue du Cancer*, treating cancer of the breast in Holland and in Amsterdam.

To the figures of Methorst and Deelman I am adding the autopsy cases of my own laboratory to show, once more, that they have no value regarding the prevalence or increase of mammary cancer in Amsterdam (Table XIX, p. 241).

We see that in Holland cancer of the breast is increasing,[3] while in Amsterdam, making allowance for the increase of its population in these 14 years, it is stationary. The table shows, moreover, one remarkable fact: In the tabulation for Holland, we see irregularities; there is not a regular increase. Furthermore, when cancer of the breast is frequent in Holland (1912, 1919, 1921, 1923) it need not

---

[1] Methorst. Report C. H., 333, I, 108.

[2] Deelman. Le Cancer à Amsterdam de 1910–1923. Bull. de l'assoc. franç. pour l'étude du cancer, 1923, xii, p. 442.

[3] Compare Figs. 2 and 3 on page 240.

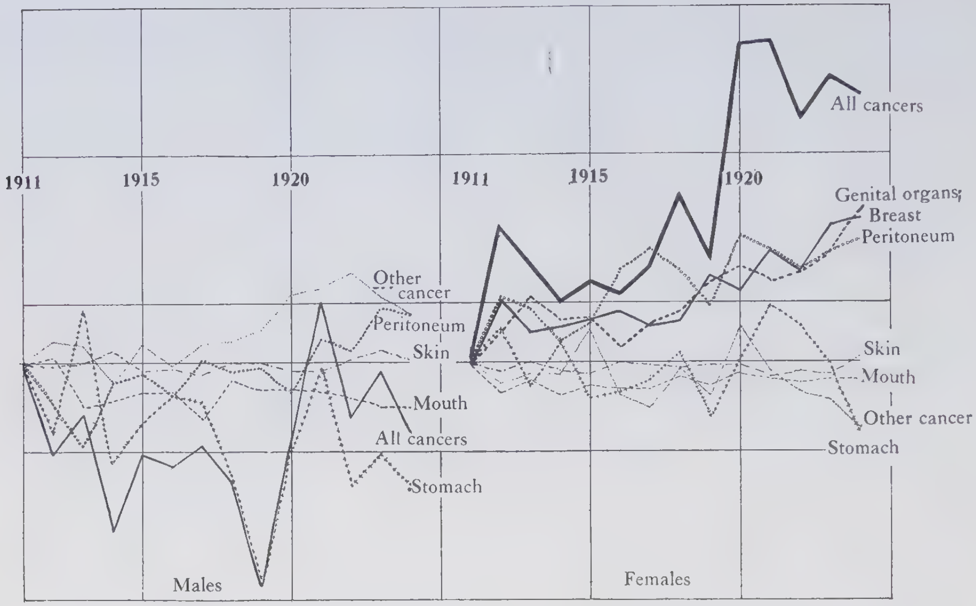

Fig. 2. Incidence of cancer in the Netherlands, 1911–1924.

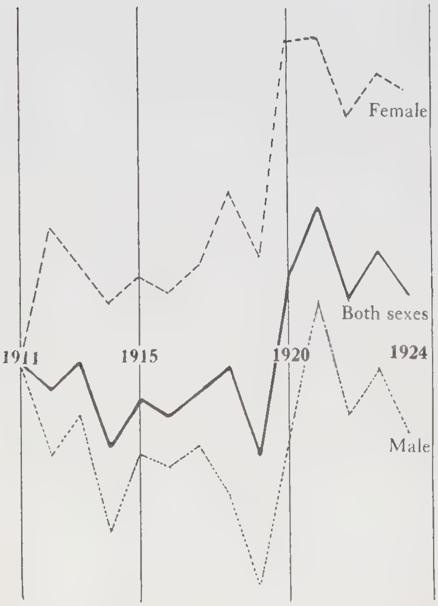

Fig. 3. Combination of curves shown in Figure 2.

Figs. 2 and 3. Course of the incidence of the forms of cancer, according to the official list of causes of death in the period 1911–1924, compared with that of 1911. All curves begin at the same place, determining for every form of cancer the figure for 1911. The curves therefore indicate the course (increase or decrease) compared with that of 1911. The combination of these curves gives the course of cancer in general for males and for females; the combination of the curves for males and for females leads to the curve for cancer in general for the whole population. It is evident that the curves for cancer in general in both males and females are greatly influenced by the most frequent forms of cancer (that of the stomach, etc.) and bear a great likeness to its curve, moderately modified by the other forms of cancer. In these curves for cancer in general for each sex, and also in the curve for the whole population, the variations in the occurrence of the separate forms of cancer are not shown.

TABLE XIX

Mortality of Carcinoma of the Breast, Holland, 1910–1923 (Methorst)			Mortality of Carcinoma of the Breast, Amsterdam, 1910–1922 (Deelman)		Autopsies, Binnen-Gasthuis, Amsterdam
1910	297		37		5
		− 0		− 2	
1911	297		35		1
		+ 68		+ 2	
1912	365		37		3
		− 30		+ 7	
1913	335		44		4
		+ 16		− 3	
1914	351		41		3
		+ 10		− 5	
1915	361		36		—
		+ 16		+ 4	
1916	377		40		3
		− 9		+ 4	
1917	368		44		4
		+ 11		− 3	
1918	379		41		1
		+ 54		− 1	
1919	433		40		2
		− 17		+ 6	
1920	416		46		2
		+ 57		+ 10	
1921	473		56		7
		− 18		− 3	
1922	455		53		9
		+ 63			
1923	518				2

be the same in Amsterdam, and as cancer of the breast is an external cancer, which is not often wrongly diagnosed or wrongly not diagnosed, I regard the irregularity in the occurrence of this form of carcinoma as *real*. It appears that cancer of the breast is occurring irregularly in respect to time and place.

4. The postmortem room shows us that there are some fairly important carcinomata that do not appear in the mortality returns with their exact localization, but in the group "cancer of stomach and liver" (because of metastases in the liver) or in the group "other forms." These are, for example, carcinomata of the œsophagus, the prostate, the pancreas, the lung, the bile ducts and the gall bladder.

The Statistical Bureau of our Kingdom (Prof. Methorst) has for the last two years arranged the group "cancer and other malignant tumors" more in detail, and gives the figures for tongue, œsophagus, rectum, larynx, and lung separately. So in the latest report we find the figures shown in Table XX (p. 242).

These are the more to be appreciated because cancers of the tongue, rectum, larynx, and, in a lesser degree, of the œsophagus, are correctly or fairly correctly diagnosed, and it becomes possible in future to draw a conclusion regarding the incidence of these forms of cancer in the course of years. Now, autopsy shows

TABLE XX.—ORGANS AFFECTED

	1923			1924		
	Males	Females	Ratio	Males	Females	Ratio
Mouth (exclusive of tongue)	81	31	2.6:1	89	28	3.2:1
Tongue	35	13	2.7:1	30	14	2.1:1
Stomach, etc. (exclusive of œsophagus)	2,141	1,921	1.1:1	2,161	1,859	1.2:1
Œsophagus	347	94	3.7:1	327	102	3.2:1
Intestine, etc. (exclusive of rectum)	311	453	0.7:1	343	456	0.8:1
Rectum	179	162	1.1:1	175	180	1.–:1
Skin	72	34	2.1:1	61	54	1.1:1
Other organs (exclusive of larynx)	476	290	1.6:1	412	244	1.7:1
Larynx	78	10	7.8:1	82	13	6.3:1
External genital organs	....	535	....	....	598	....
Breast	....	514	....	6	529	....
Lung	Not specified			58	23	2.5:1
Totals	3,720	4,057		3,744	4,100	

that cancers of the prostate gland, pancreas, lung, bile ducts, and gall bladder are also important, but that they are much more difficult of diagnosis. If these cases, however, were separately mentioned in mortality returns, and not stowed away in the rubbish heap of "other forms," we might see the difference in frequency of these cancers at autopsy and in mortality returns; we might then expect that the physician would learn in future to diagnose them more correctly, knowing that their occurrence is not very rare.

I plead, therefore, for far-going differentiation in mortality returns.

In 1916 the Census Bureau of the United States of America published a detailed report on cancer in the registration area in 1914, and I may add that this report was the result of a request of the American Society for the Control of Cancer. In the introduction to this report the request of the Society has been quoted, and although it is very brief, it is evident that the Society saw the importance of mortality returns going into details regarding the localizations of cancer. It is to be regretted that this cancer report has not been issued every year, so that we might have an insight into the course of the different forms of cancer since 1914. We want *detailed* reports on cancer in the death rates of the countries.

In my opinion, we should not ask whether cancer in general is increasing or not. I think it is; Peller[1] thinks it is not. What we do want to know is the course of the separate forms of cancer. We do not know enough, and much that is worth knowing is hidden away in the bureaus of statistics.

We cannot fight cancer in general; we can only fight each single form of cancer with more or less success, and the more accurate our knowledge is of each one of them, the better we can fight them. We want to know the peculiarities of each form of cancer, and the first important thing is to know the limits of our knowledge of it. At the present time we know that there are a great many errors in mortality returns; but I am convinced that there is more truth to be found in them than we presume at present, if the data we possess were properly utilized. Peller, who published a very good paper on cancer incidence and cancer increase, says the same: "Durch vorsichtige Handhabung der offiziellen Staetistik werden wir uns vor falschen Schluessen schuetzen, and werden trotz der vielfachen Mangel derselben viel Wissenswertes eruieren." (Through cautious use of official statistics we shall be able to protect ourselves from false conclusions, and shall, despite manifold gaps in these, acquire a large amount of valuable information.")[1]

---

[1] Loc. cit., p. 349

I should like to draw your attention to some diagrams relating to cancer mortality in the Netherlands in the years 1911–1924.

These diagrams (Figs. 2 and 3, p. 240) represent the figures for localizations of cancer according to the death rates for males and for females, indicating the course of their incidence in the period 1911–1924 as compared with that in 1911. The figures represent the increase and decrease of the number of each form of cancer per 100,000 inhabitants from that in 1911. We see that the individual forms of cancer behave very differently; some increase, some decrease, all are irregular in frequency. We see that in man several kinds of cancers have not increased as compared with 1911; in woman, cancers of breast, genital organs, peritoneum, etc., especially are increasing. The curves show a great variety. The results of these curves for the organs form the curves for cancer in males and cancer in females, and the result of these two forms the curve for cancer in general in our Kingdom. We see that a great many of the peculiarities possessed by separate forms of cancer get lost, are wiped out, in the curve for cancer in general. In my opinion the form of the separate curves is important, and that of the general curve is not.

Peller also speaks of "die zweifellos stattfindenden zeitlichen Veränderungen in der Auswahl der einzelnen Organen durch den Krebs" ("the undeniable changes at the present time in the incidence of cancer of the different individual organs"). He also thinks that these variations in cancer incidence of each organ are real, and says that no good statistical information about these variations exists.

It is possible that a study of the variation in some one or other form of cancer may give us a hint as to the cause of this variation, and possibly as to the cause of that form of cancer. Lung cancer presents an example of this. The increase of lung cancer in the last years has caused a great number of publications containing suggestions regarding the cause of the increase of this form of cancer, and the cause of lung cancer itself. It is true, the increase is observed in the post-mortem room; it may be present, however, in the death rates also, only we can-

---

[1] Ztschr. f. Krebsforsch., 1925, xxii, 320.

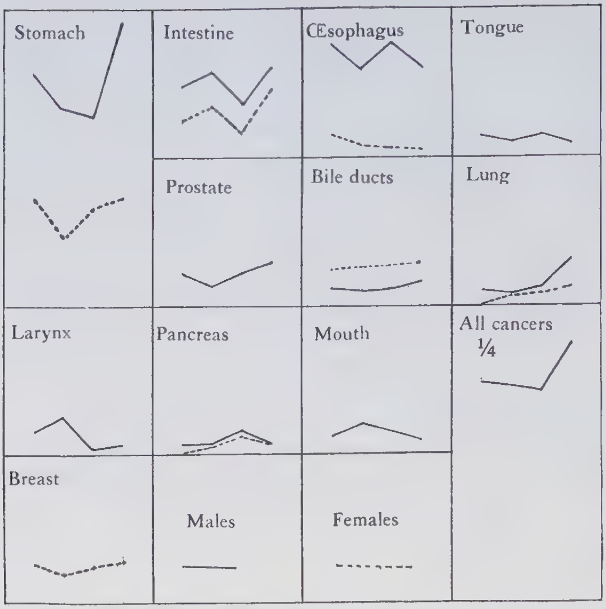

Fig. 4. Cancer at autopsy. Here I have taken the figures for some forms of cancer for each period of 4 years, and the four figures for each cancer are shown in a curve. These curves show the irregularities in the occurrence of each form of cancer. ("Die zeitliche Veränderung," after Peller.) The last diagram in this figure shows the total number, that is, the curve for cancer in general; but I have had to divide the figures by 4; otherwise this diagram would be too large.

not see it, because lung cancer is hidden in the group "other forms." Lung cancer also demonstrates the importance of details in mortality returns. *Conclusion.* Mortality returns should go as far as possible into details.

CONCLUSIONS

In the foregoing pages I have tried to form an opinion about the value of autopsy and mortality tables for our knowledge of cancer. Although we must admit that neither of these tells us the truth about cancer, I am convinced that both together give us a fairly correct idea about the disease. And they will give us more exact knowledge, if we will only try to get as much information out of them as they contain, in the conviction that each is a helpmate as well as a critic for the other.

I have tried to sum up my opinion in a few conclusions.

1. Mortality returns give too favorable an impression of the prevalence of cancer in general, and probably also of some important forms of cancer (stomach, intestine).

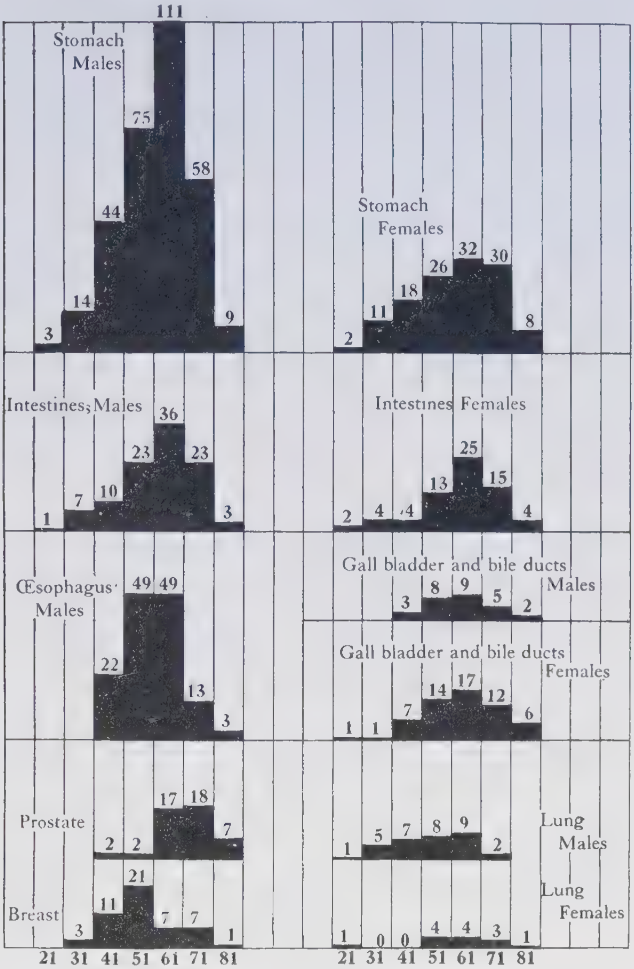

Fig. 5. Cancer at autopsy. In this diagram the original figures for some forms of cancer are arranged by age and sex. They show very clearly that death from mammary cancer occurs at an earlier period of life than death from cancer of the prostate, and that the age incidence of cancer of the stomach is different from that of cancer of the œsophagus. These differences are probably real, and not peculiar to the cases studied in my laboratory. It is probable that some forms of cancer diminish in very old age (œsophagus) and that others are increasing up to an extreme age (prostate).

2. The figures for some external cancers may be considered as fairly correct (as for instance those for cancer of the skin, mouth, tongue, pharynx, larynx, breast, and uterus). Statisticians should mention these cancers each under a separate heading.

3. Cancer of the *liver* in mortality returns being almost always secondary, this diagnosis should be registered separately, in order that we may learn the importance of this error in diagnosis.

4. Mortality returns should go as far as possible into details; it is not the course of cancer in general, as such, but the course of the different forms of cancer taken separately, that interests us.

5. Autopsy and mortality returns together give us a fairly correct idea of the importance of cancer. Therefore, postmortem examination and specification in mortality returns must be encouraged.

THE MORTALITY FROM CANCER AMONG PEOPLE OF DIFFERENT RACES

By Dr. H. J. DEELMAN, Groningen, Holland
Professor of Pathology, University of Groningen, Holland

I CONSIDER it a very difficult task to discuss the subject of cancer and race before this assemblage, inasmuch as any investigator into this subject who is gifted with a critical mind is aware that very many things appertaining to it are still unknown, and that there are apparently even more gaps in our knowledge than there are established facts. This would not appear, however, from a perusal of various manuals dealing with cancer, in which very positive assertions are frequently made. Cancer and race are subjects which require data gathered from two different sources: they demand in the first place a familiarity with the statistics of cancer, and in the second place a full and complete knowledge of the racial composition of a nation, or of an assemblage of nations. The available information regarding both subjects is still very incomplete; a comparative research into this matter therefore still resembles in many instances a game of blind man's buff throughout. It is a task similar to that of solving an algebraic equation with several unknown quantities. To have any chance of securing satisfactory results, the searcher for information in this field of knowledge must be a person of threefold capacity, namely, a statistician, an anthropologist, and a thorough student of cancer. Thus far I have not heard of any one possessing these three qualifications, and they are least of all combined in the speaker who is addressing you. Much of the work done in this connection still shows too plainly the earmarks of lack of expert knowledge on the part of the investigator who is undertaking to judge of matters of which he has made no special study. It is possibly desirable to make this statement now, but we shall have further reference to it later on.

However, this subject also affords me an advantage, inasmuch as it gives me an opportunity to point out particularly some very distinctive data relating to the cancer statistics in the Netherlands, which I consider it worth while to communicate to an audience representing, as this does, an extensive territory. In this connection you will have no cause for accusing me in any respect of vainglorious patriotism. In cases in which it appears to me that the statistics of my country are in the lead, I shall not hesitate to point them out specifically, while, on the other hand, I shall likewise distinctly state the gaps in these statistics.

It is to be regretted that only the statistics relating to deaths resulting from cancer are available, and that no morbidity statistics whatsoever are as yet at hand. Morbidity statistics give a more accurate conception of the frequency of occurrence of the disease, while mortality statistics exclude from the statistical data all those persons who recover from the disease. In the event of our having at some future time adequate therapeutic remedies at our disposal, even then the mortality statistics would give only a very imperfect conception of the actual frequency of occurrence of the disease. While we may hope that statistics relating to this subject will become available at some future time, we have unfortunately not as yet progressed so far as that. However, even at the present time one may, with great caution, draw some conclusions regarding the actual frequency of the disease from the mortality statistics in the case of certain forms of cancer. We are well acquainted with various forms of cancer—and each of us knows personally cases of cancer which have occurred in his own social circle—in which a cure has been effected by surgery and by treatment with X-rays. It is obvious that medical assistance reduces the value of the mortality statistics for arriving at a correct conclusion regarding the incidence of cancer. Now, however, we do not know how to take this into account, and we shall use the mortality statistics as if they gave a true picture of the frequency of cancer.

Cancer statisticians have entered the field of anthropology, and anthropologists have taken up the matter of deaths resulting from cancer. It appears to me that their success has not always been equally pronounced. Your countryman Hoffman has written a book on cancer statistics, which is generally acknowledged to be good and very serviceable, and which has met with appreciation in all parts of the world. However, it seems to me that the distinguished author is pre-eminently a statistician. His statements and particulars relating to cancer in connection with a large variety of factors do not in my opinion constitute the most valuable part of the book, but the figures and the facilities which it affords for looking up any matter quickly are probably unequalled. So far as the author confines himself to statistical data, it would be very inconvenient to be without the book. However, in those parts of the work in which the author also assumes the rôle of cancer investigator, and where comparisons are made between figures without the fact being established *a priori* that they may rationally be compared, it becomes an exceedingly difficult matter to agree with him in all respects. And the sharp attacks which Hoffman had to face, emanating from such men as Bashford[1] of London, Certel[2] and very recently again from Renaud[3] are presumably to be attributed to the fact that the statistician has also arrogated to himself the part of cancer investigator. We are still in ignorance (I intend to dwell more at large on this subject in my paper) as to whether the differences in the number of cancer deaths, which are a constantly recurring feature in one and the same country, are actual or merely apparent. In view of this ignorance we are certainly not as yet entitled to assume without further investigation, in cases where there are noticeable differences in the stated number of deaths resulting from cancer in different countries, that such cancer deaths represent the true number, and this applies in practically all fields. Who would venture to make decisive statements regarding the increase in the number of deaths resulting from cancer, on the basis of the mortality statistics? How can such factors as the improved medical assistance, or the constantly increasing knowledge of the physicians, be expressed in figures? And who can fail to acknowledge that numerous factors are likely to exert an influence on the mortality? I would have it distinctly understood that I am not assuming in this connection any definite point of view with regard to the actual, or the merely apparent, increase in the prevalence of cancer, but it seems to me it would be going too far to apply, as such, the figures derived from mortality statistics as if they represented the full extent of the disease. In my opinion, Bashford did not want to do this, either, at the time. His aforesaid attack was mainly induced by the desire not to disturb the minds of the public needlessly. Particularly in the case of countries whose people one does not know by personal contact, among whom the methods adopted for obtaining the figures are often so widely different, it is difficult, or even impossible, to arrive at a well-founded opinion. I think that in cases in which a statistician has not confined himself solely to his own proper capacity, views have sometimes been adopted which have not enhanced, as such, the study of cancer. I will name another example. The well known book on cancer from the pen of Roger Williams, which has been widely circulated, contains, particularly with regard to this matter, so many specious statements that the reader feels constantly inclined to exclaim: "Bring proof of what you are writing!" The low cancer mortality among the native populations of our tropical provinces is attributed to their very plain food, while the more "luxurious" style of living in temperate zones, including an ample meat diet, is pointed out as the cause of the numerous cases of cancer in the latter countries. The author thus undertakes to find some connection between diet and cancer. But where is his proof? May it not be that in this case a wholly different mode of living, and possibly racial peculiarities also, constitute factors of far greater significance? Or may there not be countless other reasons? If there were any connection between diet and cancer, would not this likewise appear from the statistics of one and the same people or nation, or part of a nation, which should show different mortality figures for the rich and for the poor, for those steeped in luxury and for paupers?[1] In this connection I say deliberately "different mortality figures," because I do not know what this difference might be. I am of the opinion that so long as we have absolutely no foundation on which to base any possible connection between cancer and social condition—and I believe, in fact, that we are in absolute ignorance on this subject—it certainly seems exceedingly rash to attempt to make us believe that there is any connection between cancer and diet, as the author would like to do.

---

[1] Lancet, I for 1914.

[2] Lancet, II for 1914.

[3] Rev. méd. de la Suisse rom., 1926.

---

[1] Moreover, data relating to this subject are exceedingly scarce! The Imperial Cancer Research Fund of London instituted some time ago an inquiry into the connection between *prosperity* and *cancer*. I think that no final conclusion was arrived at in this case, and certainly not with regard to the importance of the diet as such. I have been unable to obtain any results in the case of the city of Amsterdam. The data required in this connection regarding the make-up of the population with respect to the age of the individual inhabitants, which constitute a necessary factor in this connection, are absolutely not available in the case of that city.

Moreover, is not the conclusion at which Roger Williams arrives, namely, that the reason the mortality in Switzerland is so high is that the entire population is so well-to-do (there being no millionaires and no paupers), exceedingly superficial? I ask whether this can be considered a logical form of argument.

Thus we see again and again that arguments founded on a few individual statistical data make it a difficult matter to arrive at a sound and well considered judgment.

On the other hand, I also believe that difficulties will likewise arise when an investigator schooled in anthropological science is called upon to give his attention to work relating to cancer.

So far as I know, only a few anthropologists have taken up the cancer problem. Up to the present time, not much work has been accomplished in this line. We do know, however, that no part of the earth's population, belonging to any race or racial subdivision, is exempt from cancer. Cancer is found everywhere, from among the Eskimos of Greenland, through the peoples of the temperate zones, to those who inhabit the tropics and equatorial zone. Neither the inhabitants of Iceland, nor those of the tropical border districts of the African deserts, the dwellers of Japan nor those of Tierra del Fuego, are safeguarded against it. Cancer is found alike among the American negroes and their kindred in Africa (see Hansemann). We know, therefore, that no part of the earth is exempt from cancer, but there are in many instances no available data whatsoever regarding the relative number of cases in comparison with the general mortality, or with the proportion of the population not affected with the disease. This will make it exceedingly difficult, and even in many instances absolutely impossible, to demonstrate the existence or non-existence of a possible connection between race and cancer. It is, however, an established fact that since members of the medical profession of the Occident have come more and more generally into contact with what we are wont to call "uncivilized" nations or tribes, a constantly increasing number of cases of cancer are being discovered. If the ordinary question regarding the increase in cases of cancer still remains in many instances a disputed one, we have certainly not as yet made sufficient progress in the case of wholly uncivilized nations or tribes to answer it, inasmuch as the necessary data are still lacking.

Professor Pittard of Geneva and Professor Nicefero of Rome, both of whom are anthropologists, while the latter is also a statistician, have during the past year been engaged under the auspices of the Sub-Commission for Cancer Research of the Sanitary Section of the League of Nations in examining into the possible connection between cancer and race. Although I am not at liberty to communicate to you any of the data from their reports (now being printed), which have already been discussed in meetings of the Board, of which the speaker has the honor of being also a member, I can not refrain from briefly pointing out to you that both these men are primarily anthropologists, and that they have up to the present time not been engaged more than incidentally in research work relating to cancer. The Cancer Section of their report is therefore dealt with somewhat briefly and superficially, although they do not conceal the difficulties encountered in evaluating their material. The final conclusions of both men are somewhat scanty. Moreover, I am of opinion that the problem has not been solved by arriving at the conclusion that there is a connection between the very frequent occurrence of cancer and dolichocephaly, or between the rare occurrence of cancer and brachycephaly. In such cases there may very likely be an accidental coincidence with some single racial characteristic (in this instance the index cephalicus), without any significance attaching *a priori* thereto. If a clear connection is to be alleged in this regard, then there is for Europe, where there is no such thing as racial purity, only one single way to prove it, and that is by *determining the racial characteristics of persons afflicted with cancer, and comparing these with the anthropologic composition of the physically sound population.* Up to the present time, however, no research work has gone so far as this. It is really the only means ot reaching a final solution of the problem. If I am informed, with regard to a given city or town, that there have occurred in it in the course of a year more cases of cancer in males than in females, this does not mean that the mortality per 10,000 male inhabitants was likewise higher than that per 10,000 female inhabitants. In such cases we must know in the first place the ratio between males and females in the living population; only then shall we be in a position to figure out the annual ratio per 10,000 living persons so as to arrive at a comparative judgment. If I am correct in this, a great many errors in the field of anthropology are committed in just this way, either consciously or unconsciously, in consequence of the complete lack of reliable data. Only when the racial characteristics of a whole population (pigmentation, height, form of cranium) have become completely known, and likewise those of the persons afflicted with cancer belonging to such population, will convincing results be obtained. So long as we have only a very inaccurate knowledge of the racial composition of the population of Europe (we know in a general way that the populations of the European countries are made up of mixtures of two or sometimes three races) and persist in taking into account only to an insufficient extent the racial characteristics of the persons afflicted with cancer, practically all research work is doomed to give no results in the end.

It follows, then, at least so far as Europe is concerned, that a great deal remains to be done before the problem of the connection between race and cancer is solved. According to Nicefero (see farther on) dolichocephaly increases in Italy in the direction from north to south—from the Alpine population to the Mediterranean race. Now it seems that cancer increases in Italy in the same direction, and this leads at once to the conclusion that there is in this instance some connection between the frequency of cancer and race. But let us suppose that a personal examination of the sufferers from cancer in northern Italy were to be made, with a view to determining their index cephalicus, and that such examination should show that this index was not in all respects proportionate to that of the average population; and let us suppose that the same should prove to be true of the population of southern Italy (and no one can know the actual conditions in this regard, as no investigation has been made): in such event the conclusion arrived at by Nicefero would remain obscure. It was not for nothing that he exclaimed in the final passage of his report that the lack of individual data makes it difficult to gain a general insight into the matter, and his report ends with a question mark.

I trust the foregoing has made it clear that very particular difficulties are encountered in the course of an investigation into cancer and race, principally by reason of lack of accurate data, with respect both to statistical and to anthropological facts. I shall, therefore, have to confine myself to the presentation of a critical review. There are numerous sources of error and incomplete statements. Each individual can form the best judgment with regard to these by referring to the statistics and other data relating to his own country, and it therefore seems best for me to use my own country as the basis or center of this discussion of the matter in hand, and to group around this the data relating to other countries of Europe.

THE NETHERLANDS AND CANCER STATISTICS

Cancer occurs very generally throughout the Netherlands. According to the latest statistics (1924), the mortality from cancer was as follows:

1923: Males 11.02 per 10,000 and females 11.64 per 10,000.
1924: Males 10.81 per 10,000 and females 11.85 per 10,000.

In the year 1923 the cancer mortality amounted to 11.42 per cent and in 1924 to 11.43 per cent, of the total mortality.

Cancer holds first place as the most frequent cause of death, the next place being held by tuberculosis in all its forms, with the following percentages:

1923: Males 9.87 per 10,000 and females 9.91 per 10,000.
1924: Males 11.04 per 10,000 and females 11.35 per 10,000.

In the years 1923 and 1924 the mortality resulting from tuberculosis (in all its forms) amounted to the following percentages:

1923: 10.54 per cent.
1924: 10.85 per cent.

It appears from the foregoing figures that cancer is in the lead, both with regard to absolute figures and with respect to the total death rate. During the last few years there have been only slight changes in the cancer death rate in the Netherlands, although it still shows a tendency to increase. The great reduction in the figures for tuberculosis in the last few years is the actual cause to which the foregoing data are to be attributed. The following figures demonstrate that the figures relating to cancer show at the present time a tendency not to change materially.

If we assume the mortality for 1901–1905 to have been equal to 100 for both sexes, the mortality during 1916–1920 is found to be 109 for males and 116 for females; during 1923, 113 for males and 120 for females, and during 1924, 111 for males and 120 for females.

You may have noticed in Hoffman's book that Switzerland has the largest number of cases of cancer, and that the Netherlands hold second place. Hoffman fails, however, to take into account Denmark, a country which has had and still has the highest death rate. According to Hoffman, Switzerland surpasses all other countries, with a cancer death rate of 124.3 per 100,000 inhabitants. The Netherlands occupy only the second place, with a death rate of 106.4 per 100,000 inhabitants. Then follow, with successively smaller figures, Scotland, Sweden, England, Norway, and Germany, all for the period 1908-1912. The more recent figures show a slight change, in connection with which the grading of the population according to age also exerts an influence. Figured on the basis of 10,000 living inhabitants over 40 years of age, Switzerland has a death rate of 43.4 for males, and of 38.4 for females (period 1918 to 1922). For the Netherlands, these figures are 36.51 for males, and 38.1 for females (1919–1921). For Denmark I figure out a total of 45.1 per 10,000 living inhabitants of both sexes over 40 years of age (1920–1922).

The differences between Switzerland and the Netherlands are therefore in reality smaller than the figures showing the proportional numbers estimated on the basis of all living inhabitants would indicate. There is no material difference between the death rates for the male and for the female sex. According to the report of D. Carrière, there has been no very material change in the death rate of Switzerland during the last 20 years. Renaud also makes a similar statement. It appears to me that, at least in the case of countries in which the cancer death rate is high, the curved lines show a tendency to straighten out horizontally, which will result in course of time in a probable uniformity or a decline in the figures indicating the number of deaths. So far as I know, however, this decline has not as yet set in to any plainly noticeable extent, although there are occasionally some differences in the figures for successive years.

I am personally of the opinion that the mortality statistics of Holland are kept very efficiently. Some errors are bound to slip in, in all statistics of this description, and those of the Netherlands are likewise not free from them, but there are various factors in our country which tend to make these mortality statistics reliable, or at least as reliable as figures originating from such sources can be expected to be. At the Dresden International Public Health Exposition, in 1911, there was exhibited a large graph showing the percentage of deceased persons in each individual country who had received medical treatment. The Netherlands were in the lead, with 93 per cent, while the next country following was Denmark, with 89 per cent. The average for the German-speaking countries did not exceed 70 per cent. A still more striking feature consists in the treatment in connection with the age of the deceased. "In the Netherlands, medical treatment is provided to an equal extent for persons of all ages, and much more frequently than in the various parts of Germany. This is due to the fact that physicians are more generally within reach in Holland, and that a higher value is attached to life in that country than by a considerable part of the population of Germany—particularly in the case of children and of the aged."

It appears to me that this particularly enhances the value that may be attached to the figures relating to the Netherlands. Since the year 1911 the figures have undergone a further change which has made them even more favorable, with the result that the percentage of deceased persons who had received medical treatment had increased in 1923 and 1924 to more than 97 per cent of the total number.

Furthermore, in the mortality statistics of the Netherlands persons are always entered under the heading of their actual place of residence, and not under that of the locality in which their death occurred, if this happened to be elsewhere. This arrangement practically prevents, therefore, the accumulation of cases in localities provided with hospitals, etc. So far as I know, the mortality statistics of Denmark and of Switzerland are the only ones that closely resemble those of the Netherlands, both with regard to the collection and the application of the figures.

Two features of the cancer statistics of the Netherlands must be placed in the foreground: (1) the mortality on the basis of the geographical extent of the disease; (2) the mortality in relation to sex.

We shall need these considerations when we come to the discussion of the subject in connection with race. The first of these points involves, primarily, a discussion of the mortality in the cities and towns as compared with the figures for the country districts. We have already supplied data relating to this matter in a published article.[1] About the year 1890 there were numerous cities and towns in the Netherlands in which there were a materially larger number of cases of cancer than in the surrounding country districts. This phenomenon completely disappeared later on, after the period 1900–1910. While the mortality has, as a matter of fact, increased very materially in comparison with that in previous years, the differences between the number of deaths from cancer occurring in the cities or towns and in the country districts have entirely disappeared, and in some country localities the cancer mortality is even somewhat in excess of the figures applying to the cities and towns. In the country districts the mortality has increased more rapidly than in the cities and towns, and this enabled them to "catch up with each other," so to speak. The mortality in some of the cities and towns in which it had attained the maximum figure has not changed materially in the course of the last few years. The increase in the number of deaths from cancer, eagerly set forth in foreign statistics, is no longer noticeable here in the Netherlands. Such a condition did prevail, as a matter of fact, but is now completely eliminated.

---

[1] Ztschr. f. Krebsforsch.

We shall next have to consider the differences in cancer mortality in the Netherlands in relation to the geographical locality. This mortality shows differences each year in the different sections of the country, with a regularity which to a certain extent indicates permanency.

It appears each year from the mortality statistics that the number of deaths caused by cancer is slightly less in the northern than in the southern provinces. The Netherlands are divided into 11 provinces, of which North Holland and South Holland have the largest population. The three largest cities in the country—Amsterdam, Rotterdam, and The Hague—are located in these two provinces. The cancer statistics *of all countries*, in so far as they are known to me, *show differences in the geographical distribution of the disease*, but in this regard the statistics for the Netherlands certainly present a very peculiar feature, namely, that not only are these differences here very slight, but the figures indicate an undeniable tendency to decrease in the course of years. For the period 1919, 1920, 1921, for instance, the figures show the annual mortality per 10,000 inhabitants above the age of 40 to have been for the different provinces as follows:

Friesland	41.85
North Holland	40.69
Groningen	40.60
Utrecht	39.12
Drenthe	38.93
Gelderland	37.94
Zeeland	37.75
Overijssel	37.54
North Brabant	36.70
South Holland	36.40
Limburg	29.52

The figures for the first 5 of these provinces exceed the average figure for the year, while those applying to the last 6 show the mortality to have been below the average figure for the year. If we divide the 11 provinces into the two groups thus indicated, we find the average mortality in the first group to have been 40.3 and that in the second group 36.1 per annum. For the period 1901–1909, these figures were respectively 33.05 for the minimum and 37.7 for the maximum group. The minimum figures have consequently increased to a greater extent than the maximum figures. This is the same phenomenon which we have already had occasion to notice in the case of the differences between the proportional number

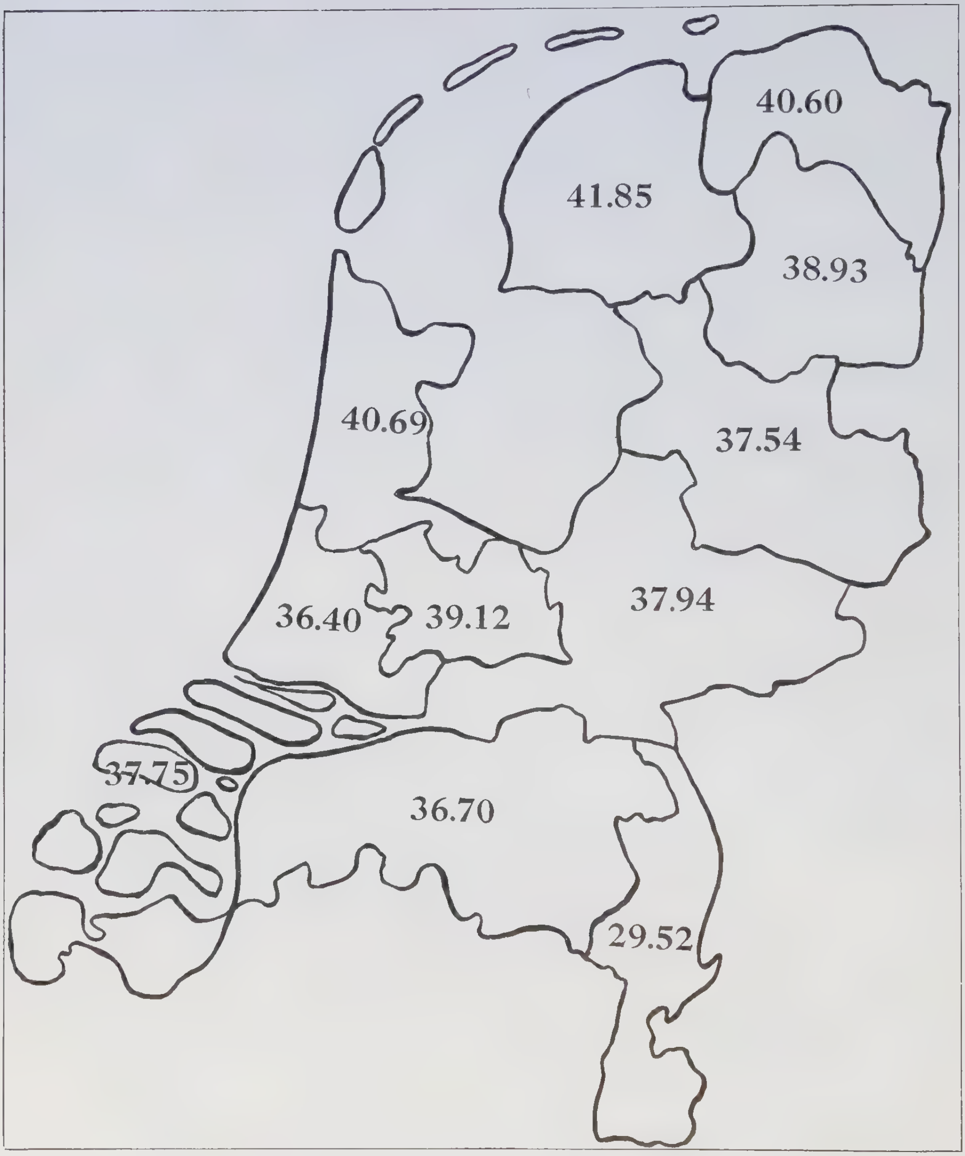

Fig. 1. Map showing the cancer mortality per 10,000 population according to provinces in Holland.

of deaths in cities and towns and in the country districts. This tendency is also plainly apparent in some particular cases, such as that of the Province of Drenthe, for instance. It is a well known fact that this province, in particular, has progressed enormously in the course of the last 20 to 25 years, and that this has even resulted in some localities in serious crowding of the population. The figures are

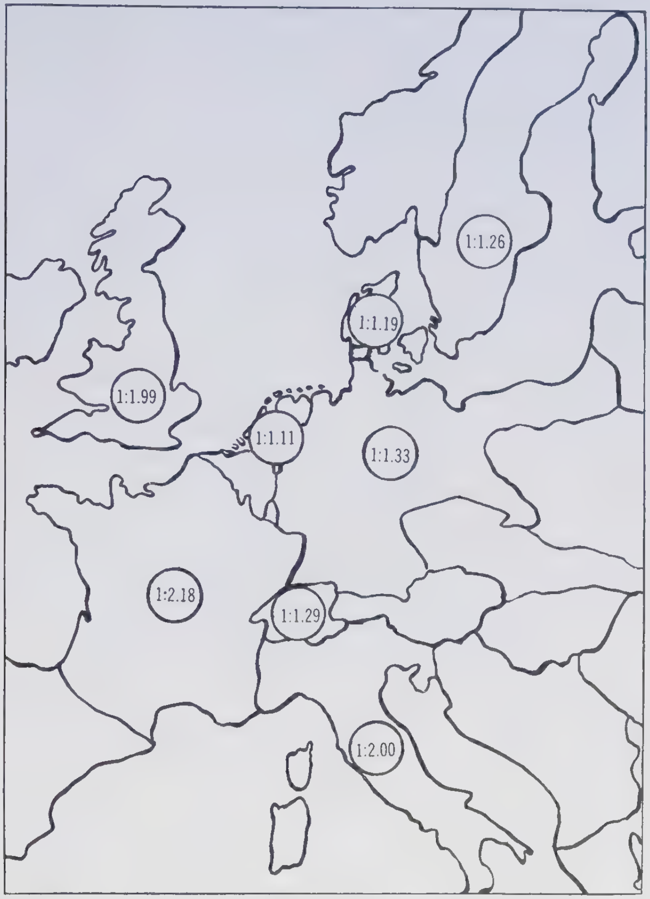

Fig. 2. Map showing the ratio of the minimum to the maximum cancer mortality in the various countries of Europe, obtained by comparing the averages reported in the different sections of each country.

as follows: period 1901–1909, 32.39; period 1919–1921, 38.93. The increase was greater than in any other province. Would it be too fantastic to see a relation between economic progress and the improved medical assistance on the one hand, and the increasing number of cancer cases reported, on the other, in the sense that these figures do not necessarily indicate an actual increase in the actual number of cases of cancer? (The number of physicians increased in the same space of time from 50 to not less than 71!) At the other extreme we see the provinces of Friesland, Groningen, and North Holland, in which the increase has been only very slight during the last 10 years. On the other hand we must mention in this connection certain particulars relating to the Province of Limburg. The death rate in this province has always been and still is very low. We are of

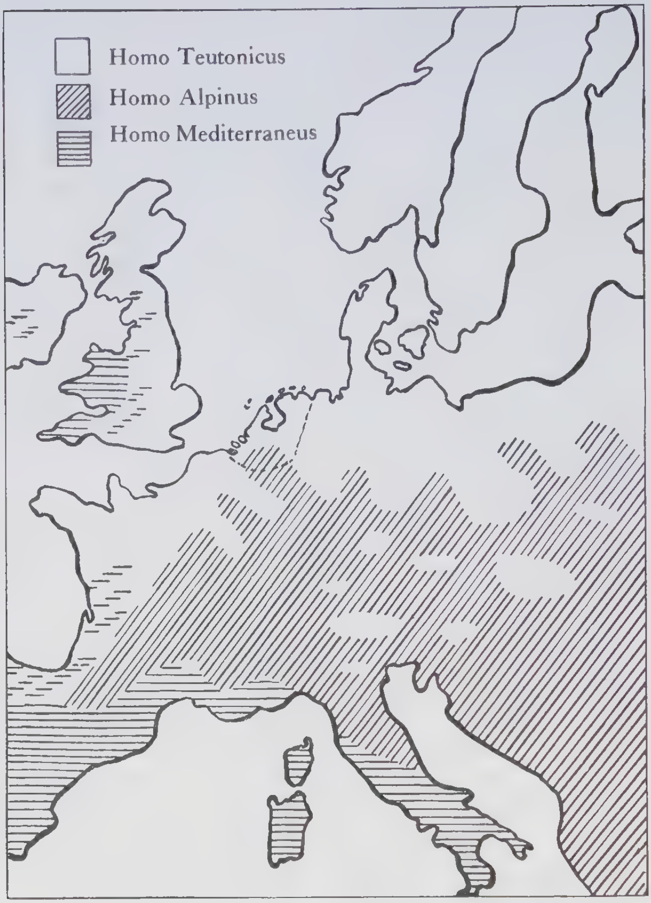

Fig. 3. Map of Grant, showing the distribution of races in Central Europe.

the opinion that there are particular reasons for this fact, not connected with the remarks concerning the racial differences which we shall subsequently submit. The death rate for Limburg was practically constant from 1901 to 1908, after which time it increased very slightly, but still remained for a long time far below those of the other provinces. The population of Limburg has recently increased, in some sections even to the extent of 86 per cent. As a matter of fact, this province is a mining territory which is being very rapidly developed. Consequently, it has a wholly peculiar population. Not only is its composition with regard to the age of the inhabitants quite unusual, but a large foreign, or at least not domestic, population has settled down within its borders. It seems rather peculiar that in those sections of Limburg which do not belong to the mining districts, namely, those in the northern part of the country, the figures differ less from those applying to the other sections of the country. It is evident, therefore,

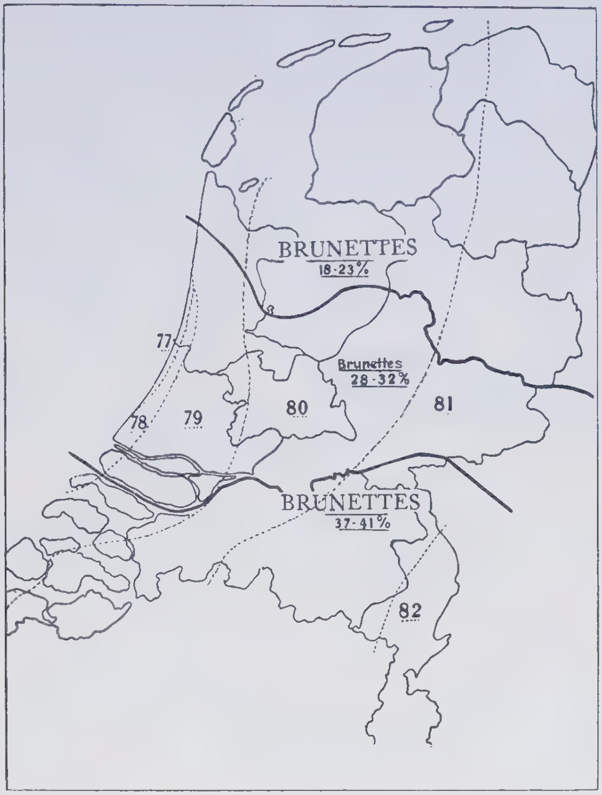

Fig. 4. Map of the Netherlands showing differences in pigmentation and index cephalicus (after Bolk).

that the mining territory, with its peculiar population, is the actual cause of the different status of this province. Thus we see, on assembling all our data, that the difference between the minimal and the maximal cancer death rate in Holland is slight. The ratio here of 36.1: 40.3 is equal to 1:1.11 estimated on a basis of 10,000 population and per year. It will be useful now to see how this compares with the ratio of minimal to maximal in other countries.

A COMPARISON OF THE NETHERLANDS WITH OTHER EUROPEAN COUNTRIES

DENMARK

I find for the various districts into which Denmark is divided statistically, the following figures (per 10,000 persons over 40 years of age), applying to the years 1919, 1920, 1921:

52.41	52.13	48.79	48.17	47.98
47.78	47.39	47.18	46.15	45.74
45.72	45.13	44.93	44.75	44.61
41.92	38.09	34.03	33.54	

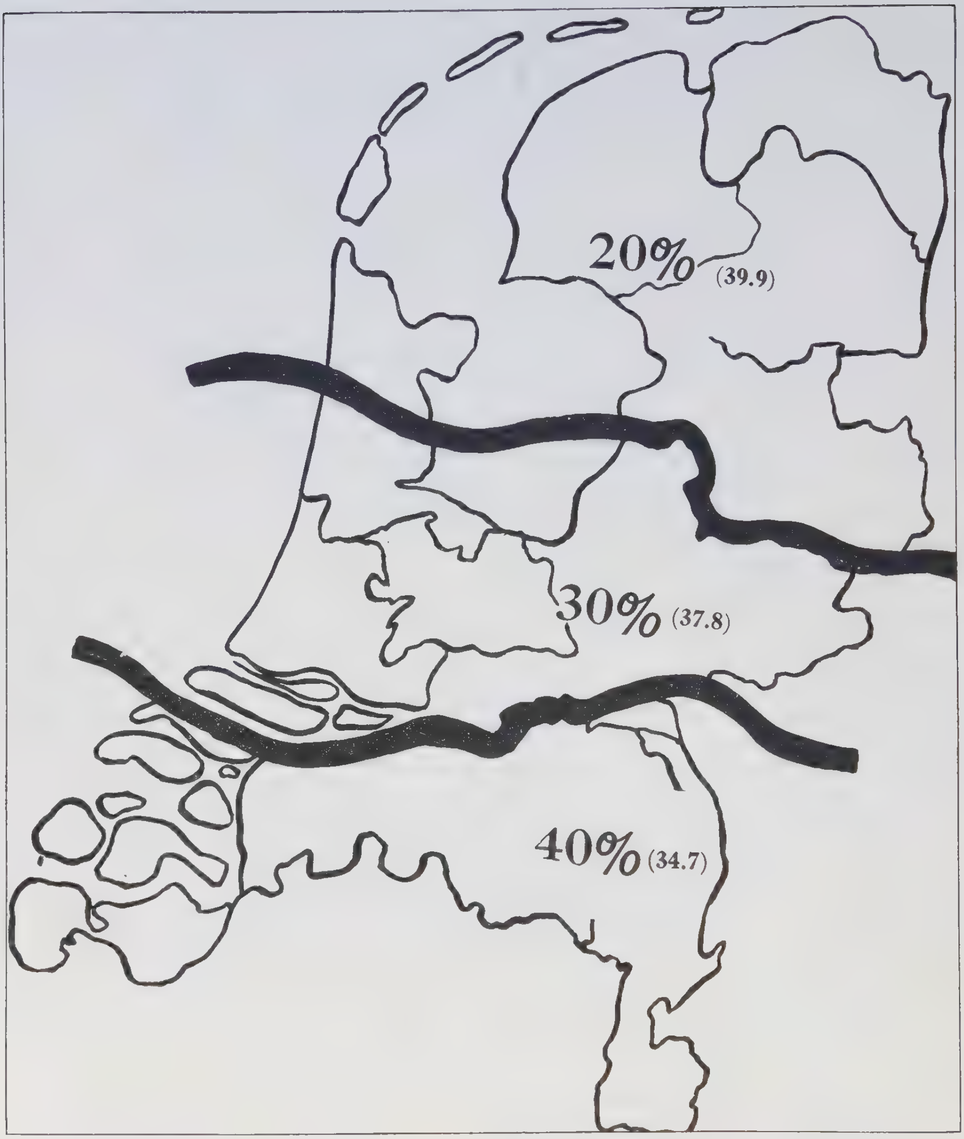

Fig. 5. Map showing the comparative cancer mortality per 10,000 population in the three racial districts of Holland. The percentages represent the dark haired population of each district.

It appears from the above list that there is quite a material difference between the figures applying to different sections of the country, and that these differences are greater than in the case of the Netherlands. The average annual figure is in this case about 45.1, figured on the basis of the entire population. The mortality is higher in 12 and lower in 7 provinces. The average maximum mortality is 47.9, and the average minimum mortality 40.3. The maximum and minimum figures are consequently in the ratio of 40.3: 47.9, equivalent to 1: 1.19.

SWITZERLAND

For the period 1918–1923, I have the annual figures calculated per year for each 10,000 inhabitants above 40 years of age. These figures are for the different districts:

60.8	55.3	50.2	51.5	48.6
47.5	46.6	45.4	45.2	44.1
43.7	43.2	42.9	42.2	42.0
40.7	38.9	38.0	38.4	37.4
37.4	37.0	35.5	31.4	20.3

These figures are to be read horizontally, from maximum to minimum.

The average mortality is 44.7 per annum per 10,000 inhabitants not under 40 years of age.

I have calculated these figures on the basis of the publication by Carrière for the period 1911–1920, and as the average cancer mortality has remained constant since these years, there is no objection to applying them to the period 1918–1923.

If we calculate the average mortality in exactly the same manner in the provinces in which it is below the average (9) and in those in which it is above the average (16), we obtain a ratio of 38.9: 50.1, equivalent to 1: 1.29.

In the report of Carrière, particular stress is laid on the differences in connection with the geographical location. A map of the country shows—and Carrière plainly indicates the same in his article—that there is certainly some connection between the geographical location of the district and the figures indicating the cancer mortality. The very low figures correspond to the most remote districts, in which medical assistance is not very efficient, even if for no other reason than because of the long distances. These are the only parts of the country where deaths without previous medical attendance are still of rather frequent occurrence, and where the death certificates have quite often to be filled in by non-professionals. It is clear that such conditions necessarily exert an influence on the cancer statistics. This applies especially to the very remote Canton of Valais in the southern section of Switzerland, which is badly in the rear with a figure of 20.3.

GERMANY

I have at hand the figures for the period 1908–1912, calculated throughout on the basis of 10,000 per annum of the age group of 40 years and over. The average mortality for this period is 29.43. Twenty-four sections or departments show a lower and 14 a higher death rate. The average minimum is 26.1, and the average maximum 34.3. The average maximum and the average minimum are in the ratio of 34.3 : 26.1, equivalent to 1.32 : 1.

ENGLAND

The years 1919–1923 supply the average figures per 10,000 per annum for persons 45 years of age and over. The average cancer mortality is 26.8. The mortality is above the average in 43 districts, and below it in 17. The average death rate of the maximum group is 42.4, and that of the minimum 21.3. The ratio between minimum and maximum is 21.3 : 42.4, equivalent to 1 : 1.99.

FRANCE

This country is divided into 87 "departments." I have available the cancer mortality figures per 10,000 inhabitants over 40 years of age for the period 1911–1913. The average death rate is 18.4 per annum per 10,000 inhabitants. Thirty-eight departments have a higher and 49 a lower death rate. The average death rate in the maximum group of departments is 26.1 and in the minimum group 12 per 10,000 persons over 40 years of age. Hence the ratio of the minimum average to the maximum average is in the ratio of 12.0 : 26.1, equivalent to 1 : 2.18.

ITALY

This country is divided into 16 districts. The available data cover the years 1917, 1918, and 1919, and are calculated upon the living population above the age of 20 years. The ratio of the minimum group to the maximum is 7.51 : 15.03, equivalent to 1:2.00.

SWEDEN

There are 12 districts with a cancer mortality higher than that of the total kingdom, which is 33.6 (maximum group 37.5); and there are 13 districts with a cancer mortality lower than the general average (minimum group 29.8). The ratio of the minimum to the maximum is 1 : 1.26. The data for Sweden are for the years 1920, 1921, and 1922, and are calculated upon all inhabitants over 40.

RÉSUMÉ

By combining these results in a table (Fig. 2, p. 257), we obtain the following data:

	Minimum average	Maximum average	Ratio of minimum to maximum
Netherlands	36.3	40.3	1:1.11
Denmark	40.3	47.9	1:1.19
Sweden	29.8	37.5	1:1.26
Switzerland	38.9	50.1	1:1.29
Germany	26.1	34.3	1:1.33
England	21.3	42.4	1:1.99
Italy	7.5	15.3	1:2.00
France	12.0	26.1	1:2.18

It appears from the foregoing that in these countries, in the order given, there is a constant increase in the differences between the minimum and the maximum mortality due to cancer. How is this phenomenon to be explained?

We have seen, on the one hand, that many investigators[1] are inclined to attribute the low mortality figures applying to the Canton of Valais in Switzerland, for instance, to errors in the statistics. In our own country we likewise think that we must adopt this assumption with regard to the figures indicated for the Province of Limburg (farther on). Pittard is also of the opinion that in the case of France the very low mortality figures indicated for some districts must be attributed to errors in the statistics, and that these must consequently be handled with great caution. On the other hand, we notice in the case of the Netherlands that the figures show a tendency to equalization in the course of years. This might lead to the conclusion that the leveling of the cancer figures in the geographical districts of one and the same country, with a decreasing difference between the maximum and minimum figures, is to be attributed to some extent to constant improvements in the keeping of statistics. When one looks back over the figures for the Netherlands applying to earlier periods (for example, 1885 1889), the constantly increasing difference between the minimum and maximum figures as one goes in reverse direction through earlier years becomes very apparent indeed. Lack of time has prevented me from showing these figures, too, in exactly the same detail as the foregoing, but if one notes that the mortality varied at that time between a minimum group with 11.2 : 13.8 and a maximum group with 35 : 37.6, while for the period 1909–1914 the minimum group was about 23.5 : 26.7 and the maximum 52.2 : 55.4, these figures plainly indicate the reality of the increasing difference.

When the city and country district mortality figures are compared with each other, the same phenomena will be observed, when taking the time duly into account. For instance, I came across the following figures:

	1885—1889	1914—1918
City	22.01	39.00
Country districts	19.31	40.00

Here also the equalization of the figures again becomes very evident.

I may be permitted to make an incidental remark concerning the figures showing the mortality due to cancer in the Netherlands during the past 20 years. We have already stated that there have been no very material changes in the figures in the course of the last few years, but that they are apparently oscillating around a maximum. I quote the following passage from the latest Report of the Central Bureau for Statistics: "The general increase in deaths caused by cancer since 1901 is due only in slight degree to cancer of the oral cavity and of the skin, while the other specified varieties of cancer have contributed toward it in various degrees. In the years 1923 and 1924 cancer of the breast ranked first with 66 and 68 per cent, respectively, followed by cancer of the peritoneum, intestines, and rectum, with 49 and 50 per cent, cancer of other organs with 34 and 34 per cent, of the female sexual organs with 21 and 14 per cent, and of the stomach with 6 and 3 per cent, respectively. Deaths caused by cancer of the oral cavity numbered, in 1923, 38 per cent less, and in 1924, 37 per cent less than in the period 1901–1905 (and this in a country where the consumption of tobacco has steadily increased). For cancer of the stomach, the death rate in 1923 and 1924 was about the same as in the period 1916–1920. The increase of deaths from mammary carcinoma and carcinoma of other organs has been very slight in the last 7 years."

---

[1] See Carrière and Renaud.

MORTALITY ACCORDING TO SEX

In 1920 I published the following table showing the death rate for both sexes in the Netherlands:

	Males	Females		Males	Females
1905	10.23	10.01	1911	11.05	10.68
1906	10.31	9.84	1912	10.74	11.13
1907	9.99	10.38	1913	10.87	11.01
1908	10.24	10.32	1914	10.48	10.88
1909	10.30	10.21	1915	10.74	10.96
1910	10.67	10.61	1916	10.70	10.91

I wrote at that time that the differences due to the sex of the individual were of only slight importance in our country. There has been no change in this respect in the years following 1916, and the Director of the Bureau of Statistics constantly points out that the figures for the two sexes differ only slightly and show very little variation, with the result that the mortality figures may be somewhat higher for the male sex in one year and for the female sex in the next. The figures for the population above the age of 40 differ to a somewhat greater extent, and show that more females than males die from cancer. A natural explanation of this phenomenon is to be found in the fact that the lifetime of the two sexes is not equal after the age of 40, but that women on the whole live to a somewhat greater age, an observation which will account for a slight difference. The general mortality statistics of the Netherlands also show a striking agreement in this respect with the slight difference in cancer deaths between males and females.

It appears from the statistics of many countries that the death rate of men is lower than that of women. The Netherlands, and likewise Switzerland, are an exception to this rule. In a detailed statistical research into the mortality from cancer in his country for the period 1901 to 1920, Renaud stresses this fact. He states that the assertion that the female sex is more subject to cancer than the male is met with again and again in literature, taught as if it were a religious dogma. In very old statistics cancers are in some instances stated to be three times, or four times, or even five times more frequent in the female than in the male sex. Investigators of later date, such as Ménétrier, Roussy, Wolff, Hoffmann, and also Aschoff for Germany, always refer to these differences as being a constant phenomenon. Renaud, however, demonstrates that the cancer mortality of the two sexes is equal, at least in the case of Switzerland. The Netherlands also belong in this class, while I have no data relating to Denmark. Certainly, according to age, the mortality from cancer does show important differences with respect to the organ and the sex of the person affected. This is not the place to enter further into this subject, but it seems to me that an interesting biological problem is presented by the apparent evidence that cancer attacks both sexes to the same extent. If the observation proves correct that both sexes are now equally affected by cancer in the Netherlands and Switzerland, this may in my opinion be expected to be the case in other countries as well, if the statistics can be made up with constantly increasing accuracy. In his well-known treatise on cancer in Switzerland, Dr. Carrière points out this interesting particular, although we are very well aware of the fact—to which he too makes reference—that the age incidence for cancer differs greatly in the two sexes. While young women are more liable to cancer than young men, this surplus is fully compensated for at a more advanced age by the higher mortality in the case of the other sex. It appears to me that it will be very important to continue also in future the keeping of records relating to the cancer mortality in the two sexes.

THE NETHERLANDS AND THE ANTHROPOLOGICAL COMPOSITION OF THE POPULATION

We shall now have to take up the question of the extent to which racial differences of a nation, or group of nations, can furnish a sufficient explanation for the difference in the cancer mortality, and in this connection we shall primarily consider the proportional factors in the Netherlands, and shall be compelled to deal only superficially with the conditions in the remainder of Europe. The arguments set forth on the preceding pages will presumably have made it evident that we shall have to verify our figures most carefully, inasmuch as the cancer mortality figures have very probably not the same significance everywhere. This is, in fact, always the factor which present-day scientists engaged in research work, such as the anthropologist Pittard and the anthropologist and statistician Nicefero, have pointed out to us, the former principally with respect to France, and the latter with reference to Italy. They have also studied the other countries, but not so thoroughly, since it is an exceedingly difficult matter to arrive at a full and complete judgment regarding a foreign country when one cannot personally investigate the conditions existing.

It seems desirable to insert some preliminary remarks regarding the anthropological composition of the European nations. The book of your countryman Ripley, along with that of Deniker, still serves as a basis for studying the racial problems of Europe. The mutual relations of the index cephalicus, the pigmentation of the hair and eyes, the length and shape of the face and nose, are recognized as distinguishing racial characteristics. In Europe, however, a more or less intensive blending of the races is discussed everywhere, although there undoubtedly still remain important territories in which a distinctive type predominates. The outgrown opinion of Blumenthal that all the nations of Europe must be considered as belonging to one single race, namely, the Caucasian, must be regarded as having been finally shelved, although, on the other hand, there is not as yet an absolute unanimity of opinion with regard to the number of races that must be considered to exist, if a definite relationship is to be established between the aforementioned characteristics.

The French anthropologist Boule submits the following concise table showing the minimum number of races whose actual existence is now fairly generally recognized in Europe:

Homo albus	dolichocephalic	tall and blond:	Homo nordicus
		short and brunette:	Homo mediterraneus
	brachycephalic—	short and brunette:	Homo alpinus

Briefly stated these racial characteristics are as follows:

Homo nordicus:	skull of dolichocephalic shape, long oval face, blond hair, blue eyes, tall stature.
Homo alpinus:	skull of brachycephalic shape, round face, chestnut brown hair, broad nose sometimes flat, gray to dark eyes, medium stature.
Homo mediterraneus:	skull of dolichocephalic shape, oval face, short stature, very pronounced pigmentation of hair and eyes.

As a fourth race, there is added to the three above specified the homo dinaricus, whose distinctive features are brachycephalic shape of skull, pronounced pigmentation, and tall stature.

Some authorities consider that there is still a fifth race, with skull of brachycephalic shape, and with little pigmentation (eastern Europe).

For Europe a consideration of absolutely primary importance lies in the fact that one has to deal everywhere with a more or less intensive mixture of all these types, and that the data concerning the anthropological constitution of a people, or combination of peoples, are still in many instances very incomplete. In dealing with the subject in hand we are consequently compelled to face very serious, and sometimes insurmountable, difficulties. The countries with regard to which we have in this connection deplorably slight information are England, Switzerland, Germany, Denmark, Spain, and Portugal, while those with reference to which we know something in this regard are the Netherlands, Italy, Scandinavia and, possibly, France. We have not as yet progressed much farther in the collection of most of the data in the field of racial science than the establishment of the fact that we must base our opinion on one single distinctive mark, such, for instance, as the relative degree (*i.e.*, percentage) of pigmentation, or on such data as those relating to the index cephalicus. This will then give us a general conception of the possible composition of a nation from an anthropological point of view. There is still a great deal lacking in this connection and much work still remains to be done by the anthropologist. Such countries as Switzerland or Denmark are practically virgin territories from an anthropological point of view and these happen to be two countries in which many important data might be collected by systematic research. The fact should be borne in mind that a small country, inhabited by descendants of different races, may be specifically of particular importance for the solution of the problem we are facing, inasmuch as the other data relating to habits of living, food conditions, etc., may be considered to be uniform throughout this small territory.

The well known map of M. Grant gives us a clear insight into the topographical distribution of the races in Europe, as stated above (Fig. 3; p. 258). He distinguishes the three races as homo nordicus, homo alpinus, and homo mediterraneus. The last of these inhabits principally the countries extending along the Mediterranean coast. Homo nordicus (the Teutonic race) inhabits the Baltic and North Sea districts, Scandinavia, and eastern England, and this population extends farther into the interior where it has become mixed with the type homo alpinus, which inhabits central Europe, but which has become blended with homo nordicus as far north as Norway, for instance.

I shall next give some data regarding cancer and race. Pittard is in a position to demonstrate that northern France has the largest cancer mortality, while at the same time the homo nordicus type is distributed generally and to a particularly large extent over this section of France, and is in some parts found in greater numbers than homo alpinus and homo mediterraneus. He points out that a large average cancer mortality prevails wherever homo nordicus has settled, and refers in this connection to the Scandinavian countries, the northern section of the Netherlands, and some parts of Belgium.

The population of the northern half of Italy is predominantly brachycephalic, of homo alpinus type, while the dolichocephalic (homo mediterraneus) predominates in its southern half. There are relatively fewer cases of cancer among the former than among the latter type. However, the fact that only very slight importance may attach to these data becomes evident from the fact that "islands" with a dolichocephalic population are found in the brachycephalic territory It appears, however, that these "islands," considered from an anthropological point of view, prove to have a cancer mortality exactly equalling that in the natural territories of the brachycephalic population of the country, and not corresponding to the average high cancer mortality in southern Italy. Do not these facts indicate that the differences in the cancer mortality can scarcely be explained by differences of race alone?

There are thus certain data which might indicate that homo nordicus is more subject to affliction by cancer than homo alpinus or homo mediterraneus, and that of the two latter the average cancer mortality is presumably larger in the case of homo mediterraneus than of homo alpinus.

Now what information do we derive from the data relating to the Netherlands? The Netherlands are from an anthropological point of view a very remarkable country. They are the border territory between homo nordicus and homo alpinus (in this respect, Grant's map is not quite correct), as Ripley's map plainly shows (see page 64 of his book). The border between "pigmented" and "blond" divides my country exactly into a "blond" northern and a "pigmented" southern section. His chart of the index cephalicus in Europe (p. 53) also shows a very considerable graduation, while the chart portraying the average height of the population indicates a northeasterly and a southeasterly section of my country, between which there are very material differences in this regard. All of this makes it sufficiently clear that the Netherlands are in this respect a very remarkable country, in which quite material differences are observable between the various parts of the population, from an ethnological point of view. Ripley writes: "The anthropology of this little nation is of exceeding interest." It appears, however, that, in the Netherlands also, numerous matters appertaining to this branch of scientific research are still awaiting a full and complete investigation, although some more particular and ample data have become known in consequence of the more up-to-date research work of Bolk (1908). From the point of view of pigmentary peculiarities, the Netherlands can be divided from north to south into three sections. In the most northern section (provinces of Groningen, Friesland, Drenthe, Overijssel, and the northern part of North Holland) the percentage of dark-complexioned inhabitants varies from 18 to 23. In the central territory (comprising Gelderland, Utrecht, South Holland, and the southern part of North Holland) it is 28 to 32, and in the southern territory (Zeeland, North Brabant, and Limburg) it ranges between 37 and 41. It appears from the foregoing statement that the figures differ materially, and that the degree of pigmentation increases markedly in the direction toward the south (Fig. 4; p. 259). These differences probably indicate the original presence of a pure pigmented Alpine population in the southern part of the country, in contrast with a northern population that cannot be said to have been pure Teutonic, but still contains considerable parts of such a population, inasmuch as there are indications that a non-pigmented brachycephalic race, originating from the East (Slavonic) has become mixed with the Teutonic population.

An investigation of the cancer mortality in these territories shows that for a comparison of the most northern section, we have to deal with the territories of

Friesland, Groningen, Drenthe, Overijssel, and North Holland,[1] as against Zeeland, North Brabant, and Limburg. By availing myself of data previously mentioned, I find the average annual cancer mortality (for the period 1919–1920–1921) to have been, for the age group of 40 years and over, as follows (Fig. 5; p. 260):

The most northern group:		
Friesland	41.85	
Groningen	40.60	
Drenthe	38.93	Average: 39.9
Overijssel	37.54	
North Holland	40.69	
The southern group:		
Zeeland	37.75	
North Brabant	36.70	Average: 34.7
Limburg	29.52	

The ratio of minimum to maximum is consequently 1 : 1.15.

(If we exclude Limburg from this discussion because there are in that province abnormal ratios which I have already explained, we find the ratio of minimum to maximum to be 37.23 : 39.9, equivalent to 1 : 1.07.)

This leads, therefore, to the conclusion that notwithstanding large differences in the extent of an anthropologic characteristic—in this case pigmentation—the differences in the cancer mortality are nevertheless very slight. These figures assume a special importance by comparison with the relative figures, as studied very fully for Italy by Nicefero.

In this connection I find that in the presence of *less pronounced* racial differences (in so far as these can be judged on the basis of the pigmentation characteristic) the differences in the cancer mortality are very much *larger*. The figures are as follows:

	Pigmentation Minimum	Pigmentation Maximum	Cancer mortality Minimum:Maximum
Netherlands	18 per cent	41 per cent	1: 1.15 (1.07)
Italy	40 per cent	60 per cent	1: 2.07

No matter what racial characteristic is investigated, the result will always show the small differences in the cancer mortality in the Netherlands, in comparison with much greater differences in other countries. Inasmuch as, with the single exception of the pigmentation of the Dutch people, the data regarding the other racial characteristics are much less fully known, I shall entirely refrain from giving other calculations. If we could attribute the differences in the cancer mortality in Italy actually to the racial influence, the presumption would be that these differences in the cancer mortality in the Netherlands would have to be at least equal to them, or even greater. And it appears, as a matter of fact, that the cancer mortality differs only to such a slight extent that one feels inclined not to take these differences into account at all. *In view of this illustration, we arrive at*

---

[1] I have included the entire territory of North Holland in the calculation.

the conclusion that the differences in the cancer mortality in a country whose population is of mixed anthropological composition need not be attributed primarily to the racial differences, inasmuch as we know that there are countries with well-kept statistics in which there are considerable racial differences, but in which the cancer mortality is nevertheless fairly constant (*such as the Netherlands*).

This problem may also be looked upon from another point of view. If we consider a country like Sweden, whose population ranks presumably among those of the purest stock in Europe, we shall find that there is in each province only a relatively slight difference in the various racial characteristics. Nevertheless, it seems that the cancer statistics show quite material differences in the various parts of that country. It appears, for instance, that Sweden, whose population is largely dolichocephalous (the index varying between 74.8 and 77.5), has a cancer mortality whose average minimum bears to the average maximum a ratio of 1 : 1.26 and consequently ranks between Denmark and Switzerland. With respect to the percentage of inhabitants with brunette complexions, the conditions are exactly the same. These examples show that, in Europe at any rate, no definite connection at all between cancer mortality and racial differences can be demonstrated.

The following threefold statement seems to me to express this to the very best advantage.

Netherlands: Racial differences very pronounced. Very slight difference in the cancer mortality.
Italy: Racial differences very pronounced. Very considerable difference in the cancer mortality.
Sweden: Homogeneous race. Very considerable differences in the cancer mortality.

For other countries we have as yet no data whatever in this connection. This is particularly deplorable in the case of Denmark, Switzerland, and England, which are countries that have good (possibly even excellent) statistics, but the anthropological constitution of whose population is known only very incompletely, making comparative investigations impossible.

In view of the great racial differences among the population of the Netherlands and of the fact that there are absolutely no considerable differences in the cancer mortality in the different sections of the country, I am inclined not to attach any great importance to the relationship between race and cancer. At all events, we shall have to wait until greatly improved statistics relating to other countries become available, before we can proceed further in checking up a relationship between race and cancer. In this connection, a previous knowledge of the anthropological composition of some of the European nations may prove serviceable to us. However, so far as it is possible to gain an insight into these matters at the present time, I do not believe that there will be found in Europe many indications of a connection of any sort between race and cancer.

It seems to me worth while to survey, from one uniform point of view, the differences in the figures for cancer mortality in the various parts or sections of the Netherlands, however small they may be. The psyche of the populations or inhabitants may, for instance, have some significance in this connection. My teacher, the anatomist Professor Bolk, pointed this out about 20 years ago, in connection with his researches regarding the anthropological composition of the population of the Netherlands. It is an admitted fact that there are important differences from a psychological point of view. While in the case of the inhabitants of the adjoining provinces of Friesland, Groningen, and Drenthe these differences are already so pronounced that their origin can be determined by psychological observations, they become even more striking when we are dealing with the inhabitants of Friesland on the one hand and of North Brabant or Limburg on the other. Pigmentation represents a cause of vital superiority: "la pigmentation c'est une indication de la force." It is known that the pigmented races (homo alpinus) are generally of the Roman Catholic faith, while persons of the Teutonic race are predominantly Protestants. This fact has an important bearing upon the problems we are discussing. I made in the year 1917 a comparative clinico-statistical inquiry into the cancer mortality in the provinces of Friesland and Limburg, these being the two provinces of our country which show the widest differences in the number of cases of cancer annually reported. Limburg is a Roman Catholic territory throughout, while Friesland has a Protestant population. Though I cannot assert that my investigation has resulted in a full and complete solution of the question in hand, it has nevertheless disclosed some interesting facts. The following sketch by a physician who practiced his profession first for a number of years in the central district of the southern section of the Province of Limburg, and subsequently spent part of his life in Friesland as a practicing physician, shows in my opinion quite plainly the difficulties we have to face in this connection: "In Friesland we are dealing with a population of precise habits, with a predisposition for exact sciences, who avail themselves readily of the medical assistance proffered them, which does not have to have a miraculous element in order to be appreciated. In Limburg, on the other hand, the careless and ignorant inhabitants, who frequently have also a somewhat fatalistic tendency, are very much inclined to place faith in quacks and miracle cures, like the natives in our tropical colonies, and have as a rule no great respect for the scientific physician, although they will give him a friendly reception. . ."

A characterization such as the foregoing appears to me to be an absolutely true and correct statement of the differences in the character of the two populations. One acting in my capacity as a compiler of mortality statistics in the case of a disease like cancer, the diagnosis of which is frequently not plain at first sight, must certainly hesitate to regard the two territories as perfectly on a par with regard to the accuracy of the figures supplied by them.

Has it not recently become clear that there is a connection between low figures for cancer and high figures for "unknown" and "old age" as causes of death? I do not make these statements because I want to make cancer statistics, including those of my own country, appear less valuable than they really are, but when important conclusions are to be drawn by judging between different phenomena, we must take very great care that the figures from which we start are as solidly established as possible. Determinations and conclusions which would subsequently have to be retracted are of less value to the world than one single well-founded fact, no matter how slight its importance may be for the time being.

Let us recapitulate the matters thus far discussed. The question of cancer and race must no doubt still be regarded as premature, so far as Europe is concerned. There are indications, however, that such a connection or relation is not convincingly plain with respect to this part of the world. We think that we may draw this conclusion from the fact that apparent important differences in cancer mortality are still too liable to be the result of imperfect representation of actual conditions, and, on the other hand, from the fact that Holland is a country in which there are great differences in the anthropological composition of the people, while there are only very slight differences (actually the smallest in Europe) in the cancer mortality in the various sections of the country.

I am aware of the fact that in the country of our hosts, which has a very cosmopolitan population, both with respect to race and origin, the proposition has been made to provide comparative statistics, by juxtaposition of those compiled in the United States with those compiled in the countries from which its population is descended. I am, however, of the opinion that practically useful results can be expected only if the statistical data are throughout as accurate and complete as is possible. The conditions apparent in Europe indicate to us that a great many improvements will still have to be made in that part of the world. It is an exceedingly difficult problem, demanding for its solution data which are absolutely dependable.

I should trespass beyond the limits within which I believe I am bound to confine my paper, if I were to enter into a discussion of the mortality on the basis of the separate organs in the different countries of Europe, from the racial point of view. I will merely say here that it seems to me that the mortality resulting from organic diseases does not differ in the European countries to such an extent as to make it necessary to attach particular importance to it at this stage of the study of cancer, unless it is made the object of very special investigations with regard to some one particular form of cancer in some of the European countries (such, for instance, as the studies that are being carried on in England, Italy, and the Netherlands, with regard to cancer of the mammary gland and of the uterus). However, studies from the standpoint of race do not occupy the most important position here.

DISCUSSION

PROF. GUSTAVE G. ROUSSY, Paris: The recent studies of cancer in colonies of France, in North Africa, especially in Morocco, show just about the same prevalence as among Europeans and bear out what Dr. Deelman has said today and Professor Johannes Fibiger yesterday. Everything points to the soundness of the belief that race has no relation to cancer.

DR. GEORGE A. SOPER, New York City: We have had the great advantage of listening to two excellent papers describing epidemiological studies of cancer.

The charts of Professor DeVries illustrated beautifully the points which he brought out. The graphic method of analyzing facts has here done an important service.

In Professor Deelman's paper we have an illustration of another kind of epidemiological research made with the aid of graphs. While Professor DeVries' study was intensive, Professor Deelman's was extensive.

I have great hopes that some of the mysteries of cancer will be solved by epidemiological work. This kind of research has never done more than skim the cream from the surface of the subject. If we could have men especially fitted by natural talent and training to go into the field and study cancer as it ought to be studied, we might get information which would surprise us. Up to the present, most of the investigations in this direction have been carried on without skill or experience. If laboratory research were not done any better than field investigations are, the outlook for additions to the existing knowledge of cancer would be very slight. It is curious to observe that, whereas only persons of good training and natural ability are thought fit to carry on work within the four walls of a laboratory, any statistician or general practitioner of medicine or social worker is commonly looked upon as qualified to do epidemiological work.

The fact that everyone is not qualified by nature to become an epidemiologist was brought to my mind during my service in the Army on an official visit to Camp Mead. It had been my duty to examine a number of epidemiological reports from that camp, and I now asked the camp surgeon how he was able to find physicians who could do this work. He replied, "I don't get doctors, I get lawyers." The type of mind which leads a man into the law and the mental training which he gets in his study of that subject enable him to take up epidemiological investigations very well, after he gets the medical information which he needs.

An illustration of the high value put upon epidemiological studies, when properly made, was afforded by Robert Koch not so many years ago. The great German bacteriologist trained a small group of men and provided them with a portable laboratory with which to examine the excretions of persons for the typhoid bacillus. Koch had an idea that healthy people as well as sick ones sometimes threw off typhoid germs. He believed that if he could send properly trained men to some little town to examine the excretions of all the inhabitants, whether they had typhoid or not, he would be able to throw light on the curiously sporadic appearance of typhoid in such places. The little town of Trier was selected for study. The flying laboratory was sent there. The investigators established themselves and went to work. What they discovered was illuminating. It furnished the basis for the theory of the healthy carrier in typhoid. No contribution of such importance has been made to the etiology of typhoid in recent years. It would mark an epoch in our knowledge of cancer if something of this kind could be done in regard to this disease. Your qualified epidemiologist is a man of an unusually logical type of mind, with a passion for investigation and a thorough equipment of pathological information.

THE CHANCE OF DEATH FROM CANCER

By LOUIS I. DUBLIN, Ph.D., New York City
Statistician for the Metropolitan Life Insurance Company

CANCER as a cause of disability and death is increasing. There is no longer any room for doubt as to that. We have made an analysis of the rates concerning close to 125,000 deaths from cancer which have occurred among the many million industrial policy holders of the Metropolitan Life Insurance Company between 1911 and 1925 and have satisfied ourselves that the apparent increase as shown in the annual figures of cancer mortality was real and significant. A parallel investigation by Dr. Schereschewsky of the U. S. Public Health Service of the data for the general population of the Registration States of the United States led to a similar conclusion. Competent studies throughout the civilized world confirm these findings. The increase in the death rate from cancer can no longer be explained away on the score of improved diagnosis, or of changing age and race constitution of populations. The facts point unmistakably to a significant increase in the cancer rate, at the older age periods of life, especially among males, and, in certain types of cancer, by organ or part affected.

A discussion of cancer mortality should not, however, be limited to a consideration of the death rates for this disease. These figures, important as they are for a determination of the actual trend of any disease or condition, do not throw much light on what is, after all, uppermost in the mind of the intelligent layman. What he wants to know is, what is his chance of escaping or dying from cancer and what is the total budget for the present generation, which cancer can claim either in the United States or any other country under present conditions? That is the main point which I purpose to discuss in this paper.

The decline in recent years in the preventable diseases of youth and early maturity, such as typhoid fever, tuberculosis, pneumonia and others, has resulted in a marked change in the proportion and number of persons in middle life and in old age. The life conservation campaign of the past 20 or 30 years has saved millions of people in the early adult ages and has transferred them to those ages where they are exposed to the effects of cancer, of heart disease, and of other diseases characteristic of the advanced years of life. Under conditions of 1924, for example, over 17 per cent more male persons reached the age of 50 than did in 1910, and over 13 per cent more females attained that age than in 1910. As a result, the total number of cases of, and deaths from, cancer might very well be expected to rise from year to year, even if there were a stationary, not to say an increasing, cancer death rate at each age of life. Our problem is, therefore, to discover a measure of the gross budget of cancer under the changing conditions such as have prevailed during the past 15 years.

This can be accomplished readily enough through the use of a device known as the life table. Primarily, life tables show what the probability of dying is during each year of life from birth on through the several ages. Having computed these figures, the next step in constructing a life table is to assume an initial cohort of 100,000 persons either at birth, or at the age of 10, and to reduce this cohort year by year according to the calculated mortality ratios until the entire group has been accounted for by death. This process gives us a succession of deaths from all causes at each age interval in the life table from the initial to the last age. The cancer series which helps to make up the total mortality at each age is then dissected out, and similar calculations of the probability of death from cancer are then made. We have thus treated the deaths from cancer in the years 1910, 1922, and 1924, for each sex in the United States Registration States, and we can, therefore, tell for each of these years, at any age, the number of deaths that will occur from cancer at that age and at every subsequent year of life in a life table population. By dividing the number of such deaths from cancer at and above any given age by the total number of persons in the group at that age, in a life table population, we obtain the measure of the probability of dying from cancer. In a similar manner, life tables can be prepared for any other of the important causes of death.

Our procedure will be clarified perhaps by referring to Chart 1 which shows the number of deaths at each age from cancer in a life table population constructed, first, for 1910; second, for 1922, and, third, for 1924. By summing these deaths at and above any age, we can readily determine the total number of cancer deaths that will occur in the group at all subsequent years of life until the entire group is accounted for by cancer or some other cause of death. This chart shows clearly what has happened in the interval between 1910 and 1924 with reference to the number of cancer deaths. Beginning at about the age of 50 and continuing until the end of life, the number of cancer deaths among males has perceptibly increased. At about the age of 65, the actual number of cancer deaths in our life table population was close to 50 per cent higher in 1924 than in 1910. Among females, the difference is not so great and comes later in life. The increase in the actual number of cancer deaths appears to have begun at about the age of 50 and to have reached its maximum close to the age of 70.

How strikingly different is the situation with regard to tuberculosis! This I have attempted to show in Chart 2. The tuberculosis death curve for 1924 is the lowest of the three, both for males and for females. In the male sex, the decline from the maximum at the age of 37 in 1910 was practically 50 per cent. The area between the upper and lower curves shows how large has been the saving from this improvement during the main working period of life. But this very saving has served to swell the number of persons exposed to cancer and the other degenerative diseases at the ages of 50 years and over.

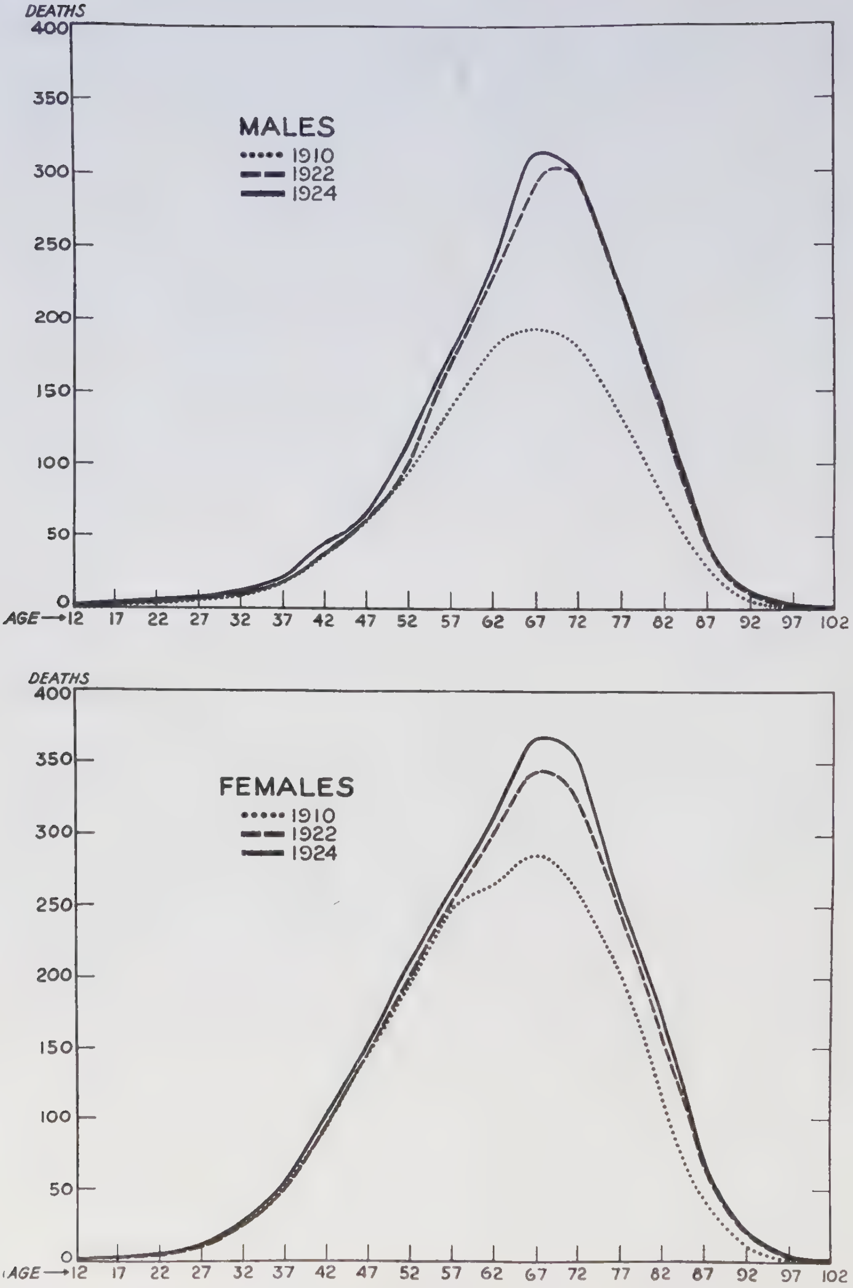

Chart 1. Cancer deaths in a life table population in the United States, 1910, 1922, and 1924, among 100,000 persons starting together at age 10.

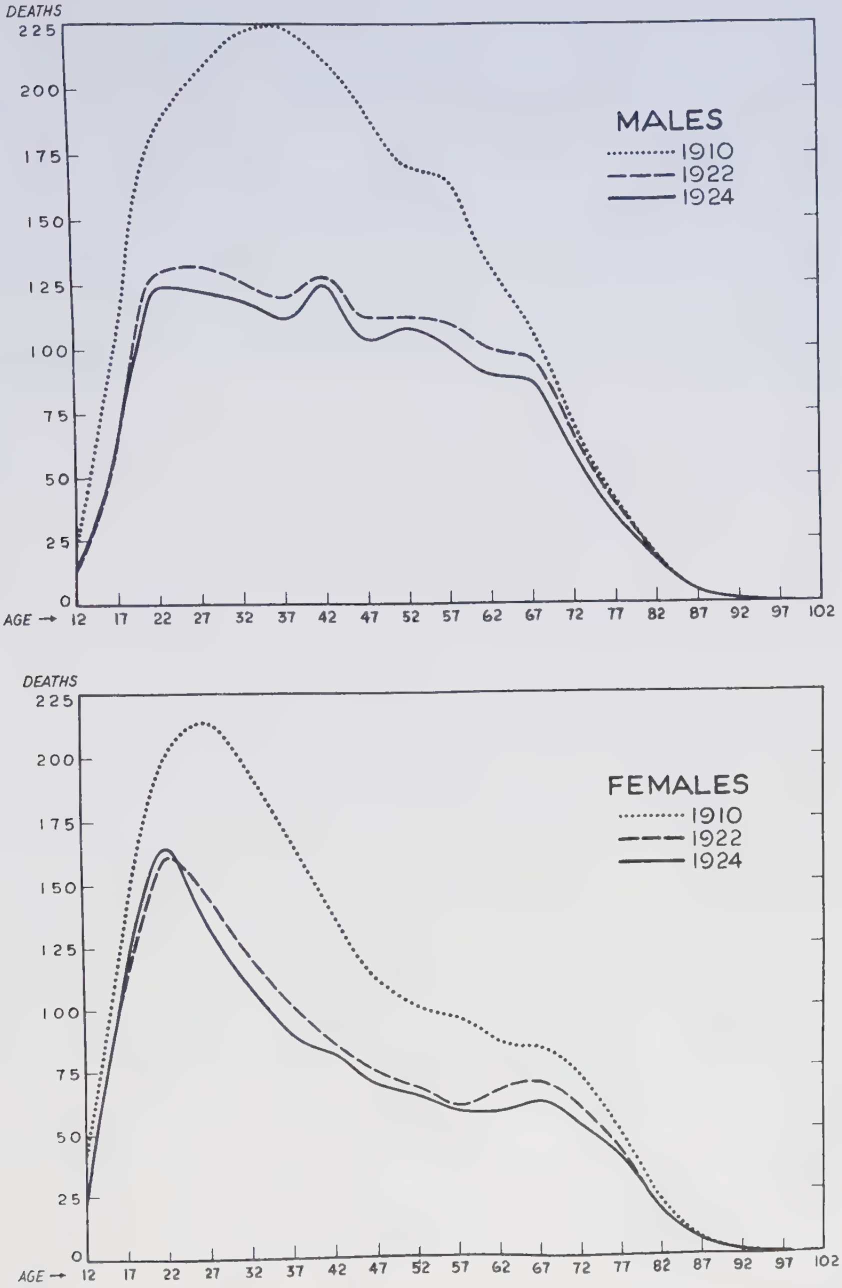

Chart 2. Tuberculosis deaths in a life table population in the United States, 1910, 1922, and 1924, among 100,000 persons starting together at age 10.

Following the method indicated above, we have prepared six tables for cancer, one each for males and for females for the years 1910, 1922, and 1924, out of the experience of the United States Registration States. These tables show what is the probability of dying from cancer, at and above a given age. We learn, for example, that a boy at the age of 10 in the United States Registration States in 1924 stood nearly 9 chances in 100 of eventually dying from cancer. There were, of course, 91 chances of not dying from cancer. This probability of dying eventually from cancer, namely, 9 in 100, remains fairly constant up to about the age of 65 and then declines to the end of life. A girl at the age of 10, on the other hand, under conditions of 1924, had 12 chances in 100 of ultimately dying of cancer. At the age of 40, this probability increases to 13 in 100, after which it declines steadily to the end of life.

TABLE I.—PROBABILITY OF DYING[1] EVENTUALLY OF CANCER AT AND ABOVE SPECIFIED AGES. UNITED STATES REGISTRATION AREA, 1910, 1922, 1924

Age	Males			Females		
	1924	1922	1910	1924	1922	1910
10	.0865	.0837	.0587	.1196	.1132	.0985
20	.0887	.0857	.0604	.1223	.1160	.1013
30	.0922	.0891	.0638	.1271	.1206	.1063
40	.0961	.0929	.0679	.1297	.1235	.1095
50	.0991	.0957	.0705	.1255	.1193	.1051
60	.0969	.0928	.0679	.1126	.1064	.0913
70	.0823	.0792	.0563	.0903	.0847	.0708
80	.0570	.0530	.0390	.0617	.0588	.0460
90	.0324	.0285	.0212	.0377	.0370	.0247

[1] Where the certainty of eventual death from some disease or injury at and above the specified age is denoted by 1.0000.

This set of figures permits us, accordingly, to compare the probability of dying from cancer with the probability of dying from other important diseases. It also permits us to compare the probability of dying from cancer now with the condition ten or twenty years ago.

Let us first see how the probability of dying from cancer now compares with the probability of dying from other diseases. Among males, under conditions prevailing in 1924, the probability at the age of 10 of ultimately dying from cancer was exceeded only by the probability from three other causes, that is to say, cerebral hæmorrhage, chronic nephritis or Bright's disease, and heart disease. It ranked fourth among males throughout the rest of life. Among females, however, under the same conditions cancer was third in the list of causes, being exceeded only by organic heart disease and cerebral hæmorrhage, and this was true at the age of 10 as at other ages of life.

TABLE II.—PROBABILITY OF EVENTUALLY DYING OF SPECIFIED DISEASES OR CONDITIONS. CALCULATIONS FROM EXPERIENCE OF UNITED STATES REGISTRATION STATES, 1924

Sex and disease or condition	Age								
	10	20	30	40	50	60	70	80	90
Males:									
Organic diseases of heart	.1922	.1958	.2029	.2111	.2209	.2310	.2407	.2397	.2084
Cerebral hæmorrhage*	.1020	.1047	.1093	.1150	.1223	.1295	.1338	.1248	.0939
Chronic nephritis	.1010	.1034	.1073	.1118	.1168	.1221	.1279	.1253	.1077
Cancer	.0865	.0887	.0922	.0961	.0991	.0969	.0823	.0570	.0324
Tuberculosis	.0642	.0621	.0518	.0418	.0317	.0223	.0133	.0066	.0022
Lobar pneumonia	.0450	.0447	.0437	.0418	.0386	.0350	.0317	.0282	.0231
Bronchopneumonia	.0195	.0197	.0200	.0204	.0209	.0223	.0255	.0312	.0391
Diabetes	.0140	.0141	.0144	.0149	.0154	.0151	.0124	.0081	.0034
Females:									
Organic diseases of heart	.1996	.2027	.2097	.2172	.2249	.2340	.2436	.2409	.2069
Cerebral hæmorrhage*	.1168	.1196	.1250	.1315	.1378	.1436	.1481	.1407	.1078
Cancer	.1196	.1223	.1271	.1297	.1255	.1126	.0903	.0617	.0377
Chronic nephritis	.0995	.1014	.1050	.1080	.1100	.1117	.1111	.1026	.0843
Tuberculosis	.0570	.0516	.0381	.0289	.0222	.0171	.0119	.0058	.0022
Lobar pneumonia	.0364	.0363	.0362	.0357	.0351	.0346	.0327	.0290	.0256
Bronchopneumonia	.0235	.0237	.0243	.0251	.0263	.0284	.0323	.0392	.0428
Diabetes	.0227	.0229	.0237	.0245	.0251	.0232	.0161	.0080	.0040

* The figures for cerebral hæmorrhage, 1924, are not now available. The figures shown for this condition are those of 1922.

What change has occurred in the relative position of cancer during the last 15 years? At and beyond the age of 10 in the life table generation of 100,000 persons, there would have occurred 5,874 cancer deaths to the end of life. In 1924, among the same group of persons at the age of 10, the total cancer budget would have been 8,652. That is to say, the probability at the age of 10 of ultimately dying from cancer has increased 47.3 per cent. In 1910, the cancer budget in the life table generation of 100,000 females at the age of 10 was 9,850, but, under the conditions of 1924, that number had increased to 11,957, or 21.4 per cent. These facts are shown more fully in the accompanying Table III.

TABLE III.—NUMBER OF DEATHS FROM CANCER AND TUBERCULOSIS IN LIFE TABLE POPULATIONS AT AND ABOVE THE AGE OF 10. MALES AND FEMALES IN UNITED STATES REGISTRATION STATES, 1910 AND 1924

Cause of death	Males				Females				Age of maximum death rate (after age of 10)			
	Total life table deaths in group starting together at age of 10		Increase (+) or decrease (−) 1910–1924		Total life table deaths in group starting together at age of 10		Increase (+) or decrease (−) 1910–1924		Males		Females	
	1924	1910	Actual	Per cent	1924	1910	Actual	Per cent	1924	1910	1924	1910
Cancer	8652	5874	+2778	+47.3	11957	9850	+2107	+21.4	67	67	67	67
Tuberculosis	6423	10356	−3933	−38.0	5701	8535	−2834	−33.2	42	36	22	26

For each of the ages beyond 10 right up to the age of 90, for males, there was an increase in the cancer hazard, running approximately from 40 to 50 per cent. Among females, a slightly different picture is shown, with lower increases at the earlier ages and greater increase in cancer probability at the higher ages. At the ages of 70 and 80, the percentage of increase was well over 40 for males, and about 30 for females.

These figures are perhaps as alarming and disconcerting a collection as have ever been gathered on the cancer mortality problem. There has been considerable misgiving over the increase in the so-called cancer death rate. But, as I have pointed out above, these figures really mask the true significance of the increase in the cancer hazard for the average citizen. We are now confronted with a new situation because of the reduction in the mortality from other conditions and this is bound to continue; for, with every improvement in the condition of life in the early ages, more and more people will approach the later period when the population is exposed to the cancer menace. A 47 per cent increase for males and a 21 per cent increase for females in so short a time as 15 years ought to call for a sharp revision of our conception of the seriousness of the cancer problem as it now confronts us. Particularly should the attitude of the medical and public health professions toward this disease be revised. The efforts which have been made during the past 10 years to deal with cancer are, in the light of our figures, relatively puny. Where we ought to be spending millions for research, we are spending thousands; where we have a few hundred physicans trained to recognize and treat cancerous states, we need thousands. The recognized facilities for the care and treatment of hopeful cases are pitiably inadequate and unorganized. The question which I wish to raise is, What are intelligent laymen, physicians, and surgeons going to do about the huge cancer hazard which confronts the average citizen today?

CANCER AS A SPECIALTY

By GEORGE H. SEMKEN, M.D., New York City
Attending Surgeon, New York Skin and Cancer Hospital

THE material upon which this paper is based comprises a cancer service of 25 years at the New York Skin and Cancer Hospital, the experiences of private practice, and communications from others concerning their personal observations and experiences of cancer and its treatment. It will be necessary, in the interest of the cancer patient, to speak frankly and critically, remembering that, however unpleasant it may be, a scientific study can regard only the truth. It is the general impression of laymen and also physicians that the attempts to cure cancer have not been very successful and that such patients are doomed to die of the disease. So general a belief must have some foundation in the facts of past experience; and although a large number of cancer patients have unquestionably been cured, the disquieting measure of failure is seemingly borne out by statistical studies. On the other hand, it is the impression of those who deal with many cancer cases that everything is not being done that can be done for these patients.

The larger number of the cases that come to the surgeon for treatment are advanced cases, few of whom have any chance of recovery. It is of no value to accept the widely distributed fatal outcome in cancer cases as something that must be expected of cancer; but these fatalities urgently demand, for the succeeding generations of cancer patients, that each of these case histories be studied in retrospect to see if something could not have been done somewhere along the line to prevent the unhappy outcome. Such a study in retrospect has shown that many cases of cancer are hopeless from the start or become hopeless through unavoidable conditions inherent in the natural history of the disease; but it has also shown that most of the others might have had a chance for life under different conditions of management. The immediate responsibility for these failures falls partly upon the physicians who treated them.

The patients' factor, caused by their lack of knowledge and understanding of cancer, is already being attacked through the educational work of the societies for the control of cancer. The physicians' factor offers a more difficult problem, affecting as it does all grades of medical men.

The general practitioner feels that he is already well informed concerning cancer. In general, he is less interested in it than he is in the more common medical problems of daily life, for which he can do something by treatment, especially the acute diseases, cancer, *ipso facto*, being out of his range.

Cancer occurs in all the fields now covered by specialties—the skin, eyes, nose and throat, gastro-intestinal tract, organs of generation, etc. Each specialist feels well informed concerning cancer, but tends to view the cancer case from the angle of his specialty instead of from the cancer angle, to the ultimate detriment of the patient. Much knowledge concerning cancer has been published, but little of this is known to physicians at large. As in the case of the common "cold," each doctor thinks he knows all about it and does not realize he knows little.

Increasing observations and experience deepen the conviction that the management of cancer cases, from the very beginning, belongs in the hands of those that are specially trained and specially fitted for this work. The complete realization of such a plan would be utopian, for it would be obviously impossible to put all the cancer work in the hands of a few trained specialists. A compromise plan would be the improvement of the cancer teaching for all physicians, while they are medical students, through establishing in the medical colleges an independent compulsory course in the natural history of cancer as developed in the cancer research findings, pathology, and clinical experience, and amplified especially as to diagnosis and treatment. An intensive training in part or all of this field could be given to men who seem specially fitted. It should be a part of the training of every specialist irrespective of the character of his prospective work.

The first step in this direction could well be taken by the societies for the control of cancer, whose widening influence would insure the acceptance of such suggestions earnestly and repeatedly made. An added impetus could be obtained by impressing upon medical men the evident need for improvement in the management of cancer cases, for, once convinced of this need, the desire and the effort for better work would certainly come from within their own ranks. It should not be necessary to delay such action until an enlightened and deeply concerned lay public, following the experience with acute appendicitis, begins to ask, "Why did you wait?" and "Why was not the proper thing done at the beginning?"

Considered in periods of time, the sequence of events in the history of a cancer case falls into three groups or stages: (1) from the beginning of the cancer up to the time of the first visit to a physician; (2) the first examination and the period of study for diagnosis, and (3) the period of direct cancer treatment.

This paper will deal with the second and third stages—the period of the responsibility of the physician, with special reference to the repeated mismanagement of essential details.

PERIOD OF FIRST VISIT OF PATIENT TO PHYSICIAN

The time of the first visit to a physician is one of the most important moments in the cancer patient's history; for while, on the one hand, he may be advised wisely, on the other hand, he faces three serious dangers, namely, the possibility of the physician's undue optimism, or his carelessness, or his lack of knowledge of cancer.

The first of these dangers, undue optimism, has it origin in the natural tendency of the doctor to allay the patient's fears, and he is led to minimize the importance of symptoms which at best are none too pronounced. Often he does not seem able to realize that this serious malady will produce so little disturbance, or that it has attacked a patient of many years' acquaintance, or a close friend, or even a member of his family. In his desire to dispel alarm, he may laugh away the opportunity to save a valued life.

The second danger is carelessness on the part of the physician. Either through habit or under the pressure of having to see many patients in the limited period of time allotted to office hours, he hurries through what should be a well ordered visit. No detailed history of the case is taken, no attempt is made to elicit other symptoms not told or noted by the patient, and a hasty examination or no examination at all is made. First impressions are accepted without following through, a snap diagnosis is made, and the cancer is not recognized. The patient does not know the seriousness of the apparently unimportant symptoms and does not follow up the matter, especially if the physician (whom he trusts) has made light of them. This carelessness is one of the outstanding evils in cancer experience.

The third danger is the physician's lack of an adequate knowledge of cancer. This is shown in all three fundamentals of this early stage, for, all too frequently, he does not know the suggestive subjective symptoms, he does not recognize early objective signs, and he does not know how to examine such patients.

SUGGESTIVE EARLY SYMPTOMS

The insidious nature of the onset of cancer has been known and repeatedly emphasized for many years, but it seems to have made its permanent impression upon the mental vision of the cancer worker alone. Obviously, cancer patients at this stage could come into the hands of the cancer specialist only through the merest of chances, so new ways must be found to bring home to the physician at large his need to acquire this part of the specialist's knowledge. This special teaching must take from him his time-honored and tenaciously held reliance upon symptoms that are characteristic only of advanced cancer, and must stress the importance of the smallest disturbances in function if these are continuous or recur frequently. It is not necessary that he should make the diagnosis; the mere suspicion of the existence of cancer is sufficient if it serves to direct the patient into the proper channel. The urgency of the need of intensive teaching in this field of cancer work needs no added comment.

THE RECOGNITION OF EARLY OBJECTIVE FINDINGS

Experience has shown that the physician at large is not well informed concerning the appearance and general physical characteristics of cancerous lesions, and many diagnostic errors have occurred in consequence. Subconsciously, the diagnosis of so serious a disease as cancer seems to require association with an equally serious-appearing lesion, and many small cancerous lesions are passed over as unimportant, even though they may show characteristics typical of cancer.

Equally frequent is the error of not recognizing lymph-node masses as possible metastatic cancers, and, in consequence, of not suspecting and looking for the possible primary cancer. The primary cancer is often very small in size, irrespective of the size of the metastasis, and has escaped detection because this retrograde search for such primary cancers does not seem to be a usual mental process with the physician at large and, regrettably, with many more experienced clinicians.

The specialist trained in cancer work will be less likely to fall into error in interpreting objective findings. He will not only learn the gross appearances of cancerous lesions, but he will also learn how to reconstruct the development of the lesion he is examining, from the patient's history and the existing status, differentiating in this way, often with success, between the confusing inflammatory processes and the new-growths. Similarly, in the metastasizing cases, the cancer specialist will know the natural history of cancer with reference to metastases, he will know the channels of lymphatic distribution for each important cancer region, and he will know how to be painstaking and persistent in his search for the primary tumors, when lymphatic enlargements suggest the possibility of their presence.

METHODS OF EXAMINATION

Closely related to the need of a better theoretical knowledge of cancer is the need of a considerable degree of improvement in the methods of examination to be followed in suspected cancer cases. Unquestionably, better methods in these early examinations would lead to earlier diagnoses, and the value of a specialized training needs no better argument than this for its acceptance.

It is axiomatic that the examination of these patients must be complete and thorough. In order to insure this, a definite routine plan of examination should be worked out for each cancer region, that would cover the entire field and would detect all the changes present, non-cancerous as well as cancerous. It should be persistently carried out in spite of the frequent technical and purely personal difficulties. Much assistance in thoroughness of examination can be derived from the use of local or general anæsthesia, of which aid, experience has shown, the physician at large has made far too little use.

The value of making diagrams and exact measurements as part of the record of physical examinations has long been known, but nowhere else does it have the importance that it has in the examination of a patient with suspected or recognized cancer. It imposes upon the examiner the need of a close and exact examination of the lesion found, to determine its size and outline and to note the physical characteristics of every part of the process. By measuring the distance of the lesion from certain landmark lines or points, he will determine the exact position of the lesion, the extent to which it has invaded the organ in which it is found, and the extent of its invasion, if any, of the neighboring structures. To complete this record, he will also be impelled to search for possible secondary tumors, near or remote, based on the experiences recorded for similar cases. Unfortunately, this custom is not the habit of the clinician to whom the cancer patient applies for his first examination, and he is usually satisfied with a casual and hasty inspection from which he can learn little.

The specialized methods of examination of the different regions of the body have been highly developed by those who limit their activities to these respective regions. To varying degrees, these special methods of examination have come into general clinical use also, but a critical review of cancer experience reveals the necessity of a much wider application of these special methods in general practice, coupled with an increased efficiency in detecting and interpreting the small changes of early cancer, for which no announcer has been provided.

The need of an additional cancer training has been equally evident among the various specialists whose greater knowledge and competence in their restricted branches have not prevented numerous failures of cancer diagnosis. A few of the procedures in making examinations that could be taken from cancer experience will be enumerated.

In examinations of the mouth and pharyngeal regions, for example, palpation with the index finger can add much that the eye has missed, notably in detecting small fissures or areas of roughness, indurations and other relative changes in consistency. It is the only way in which tumors under the surface can be discovered early. It can explore lesions the edge of which alone is visible, and only by palpation can the depth of observed lesions and the extent of fixation, if any, be determined.

It is frequently important to know if any of the lymph nodes of the submaxillary region are enlarged or indurated, and external palpation of the neck is the usual method of examination. But the soft fat and the yielding floor of the submaxillary space allow these lymph nodes to travel in front of the examining fingers and even relatively large and firm nodes are not found. Fixation of the floor of the mouth, obtained by inserting the index finger of the other hand into the mouth, will give a firm surface against which even small lymph nodes can be palpated.

In the supraclavicular space, enlarged lymph nodes may escape detection if the patient is examined in the sitting or standing posture, because the loose fat may allow the nodes to descend behind the clavicle. Such patients should be examined while lying on their backs. In the axilla, however, the conditions are reversed, and lymph nodes in this region are most readily found by palpation if the patient is sitting or standing.

For examinations of the breast, the patient should always be made to lie upon the back with a slight roll of the body to the opposite side, and with the arm of the same side raised well above the head. This posture, which causes the breast to lie relatively flat upon the firm chest wall, will facilitate the examination and will tend to give more trustworthy findings.

In examinations for cancer of the uterus, the customary vaginal examination should always be supplemented with a rectal digital examination. This will add valuable information concerning the posterior surface of the uterus, where small irregularities often have great significance, and will detect early invasion of the parametrium.

A fundamental rule in cancer examinations is that the examination must be satisfactory and must leave the minimum in doubt. It is a wise safeguard against error to repeat the examination at an early date to verify the negative as well as the positive findings. It is the duty of the examiner, also, to look for associated systemic conditions, since these may have a determining influence on the plan of treatment to be followed.

Throughout the whole range of cancer examinations, there is one fundamental requirement that is constantly in the mind of the cancer specialist, but singularly has received little attention from clinicians, namely, the need of gentleness in handling cancerous regions. With a clear mental picture of small blood-vessels, lymphatic vessels, and lymph spaces filled with cancer cells, the examiner will handle such tissues with the utmost care to avoid dislodging any of these and setting them free to drift in the blood or lymphatic streams. A fine tactile sense will give the necessary information as to induration, extent, and fixation without adding any metastases and spoiling good chances for recovery.

PERIOD OF OBSERVATION AND STUDY FOR DIAGNOSIS

With the discovery, in these first visits, of a lesion or a condition suggestive of cancer, a new cancer chapter begins—the period of observation and study. With it come the dangers of another series of errors which can be lessened only through a better training in cancer experience.

The first indictment concerns the harmful delay caused by the carelessness or indifference of the respective physicians in charge. The records of unsuccessful cancer cases show instance after instance of a useless waiting for something to happen, where an intelligent study should have been made instead. Suspected cancer cases are not a proper field for "watchful waiting" or for the application, in succession, of useless remedies from which no beneficial effects could logically be expected. The long list of such ointments, lotions, sprays, washes, remedies for "indigestion," laxatives, suppositories, etc., form a melancholy procession in the cancer review. There is no excuse for delay, for even if the lesion may seem stationary, the possibility of metastasis is an ever-present menace. If there is any doubt, or if improvement does not occur within a brief time, the physician should seek experienced advice upon what may prove to be a serious condition.

As a beginning, he should know the other pathological conditions that might be mistaken for cancer (and the converse), and have the procedures necessary for differential diagnosis follow in rapid sequences. A time limit should be set at once, within which the diagnosis should be established if possible. Obviously, such a reasonable period of delay cannot be arbitrarily fixed for all cases, but would vary in duration for the different regions of the body, conditions within the mouth differing greatly from those of the breast, and these, in turn, having no resemblance to those of the gastro-intestinal tract.

An unfortunate experience has been the occasional coincidence of these other, non-related conditions in cancer cases: for example, the presence of the tubercle bacillus or Vincent's spirillum in mouth cases, an associated chronic mastitis or cyst in early breast cases, gastric ulcer independent of cancer, bleeding hæmorrhoids coincident with cancer in the upper rectum, etc. Positive findings of such conditions have produced much mischief, partly by delaying the diagnosis of cancer and partly by inviting active harmful local treatments.

The most common associated condition, and probably the most confusing, is the finding of a positive Wassermann reaction in the blood, for syphilis produces some lesions that closely resemble cancer. Considerable doubt at once arises, as to how this should be interpreted. The cancer worker is less easily misled by these blood reports than is the general clinician. He knows that the lesion may be entirely cancerous in nature, even though the Wassermann reaction is strongly positive, syphilis being merely coincidental. He also knows that such suspected lesions may be wholly syphilitic in nature, even though the blood examination gives no evidence of that disease. It has been surprising to note the number of instances in which a positive Wassermann report has led the physician to continue an anti-syphilitic treatment through many months, even though the lesion showed a progressive advance during the entire period. These offenders against the cancer patient have not always been the less experienced physicians at large, but very often have been prominent clinicians or specialists.

With a better cancer training, the physician will know that, with rare exceptions, a lesion that resists anti-syphilitic treatment through a period of three weeks is not syphilitic in nature, and this period of time will mark the maximum period of such treatment. More difficult to judge is the group of cases in which cancer has developed in a syphilitic lesion, for here the anti-syphilitic treatment will result in a definite degree of improvement. As soon, however, as the improvement ceases, the probability of the added cancer condition must be considered.

In the diagnosis and study of cancer, the X-ray examination has proven of incalculable value, especially in cases involving the bones and the gastro-intestinal tract. It could have done even greater service if it had been more generally used, and if its use had been guided by a better understanding of cancer on the part of both the clinician and the roentgenologist.

The clinician's first error has been in delaying the X-ray examination or omitting it, partly because he did not think of it or did not know its value, and partly because of a mistaken desire to avoid the expense. More important, however, have been the errors of the rœntgenologist. He has frequently failed to make a sufficient number of films or he has not made stereoscopic films where these were needed. He has not always followed a logical and safe technique in gastro-intestinal cases, either failing to carry the examination through the requisite few days, or, more unwisely, failing to make a barium enema examination in intestinal cases. He has not hesitated to report negative as well as positive findings from films that were lacking in sharpness and detail, instead of insisting upon a second examination, and he has repeatedly overlooked the small changes in outline and structure that mark early cancerous changes.

The clinician's second mistake has been his willingness to accept the negative report of the rœntgenologist as conclusive without a personal examination of the plates or films. The rœntgenologist is not a clinician, he does not know the patient's history and physical status in detail, and cannot have them so intimately in mind, when the films are studied, as would the family physician or clinical specialist. The slight, often phantom-like, early changes are therefore either not seen or they are not reported as significant because the rœntgenologist's natural caution leads him to report only the very evident and definite changes.

The clinician's third error has been his failure to have the X-ray examination repeated after a short interval, if nothing significant was found in the first examination and the diagnosis remains in doubt. Such later examinations may prove as sterile as the first, but, on the other hand, the more advanced cancerous process may have then become capable of X-ray demonstration, or there may be evidence of a progressive, even though slight, increase in the extent of small changes noted in the first series of films, that would be determinative.

During the period of study of suspected cancer lesions for diagnosis, the purely personal factor of observation concerns itself with the behavior of the lesion, noting particularly any progressive advance in the process and evidences of invasion of the adjacent tissues. Instead of a fortuitous trusting to memory or to fragmentary notes, an efficient cancer training would systematize this observation by means of charts and measurements showing variations in the size and shape of the process and changes in its relation to the definite landmarks of the involved region.

Another serious indictment of the physician imperfectly trained in cancer knowledge is the experience of case after case in which early and often hopeless metastases have been produced or the growth activity of the cancer has been greatly increased through his ill-advised handling and his unwise treatment of the lesion. The danger of dislodging cancer cells present in tissue spaces and vessels has already been emphasized in the critical review of methods of examination. It is repeated here because many of the cancerous masses under observation and study are diagnosed as inflammatory processes (particularly when situated in the breast), and the patient is advised to massage the mass every day for ten minutes or more. This pernicious advice has been found to be the practice even of physicians whose professional standing would indicate that they should have known better. A sharper cancer sense would so impress the danger of this procedure upon them that they would advise strongly against massaging any mass, no matter how innocent it might appear to be, for fear that cancer might be present, and they would earnestly warn every patient against pressing upon the mass to find out how it is progressing.

Equally difficult to understand has been the widespread experience of the use of irritant chemicals upon ulcerated cancer surfaces. Even if the silver nitrate, iodine, various acids, carbon dioxide snow, and strongly antiseptic douches could have a beneficial effect upon non-cancerous ulcerations (and this is not conceded), the possibility that the lesion may be cancerous should have been deterrent. Other physicians have felt called upon to clean out supposed granulations with a curette or some form of cautery, or have excised the ulcers close to their margins, always failing to appreciate the possibly cancerous nature of the disease. Time and again, under such mistreatment, small, quiescent cancers have become highly malignant.

BIOPSY

The final step necessary in cancer diagnosis is the removal of a small piece of the suspected tissue for microscopic examination. This has the very great advantage of being easily applicable to many regions and of usually giving a conclusive microscopic diagnosis at an early stage. The great value of this needs no comment. Some doubt has arisen, however, as to the safety of the procedure, and although a large number of experiments on cancer-bearing mice have apparently demonstrated the absence of any harmful effects, most cancer surgeons condemn its indiscriminate use as very unsafe. The theoretical objections are that the cutting edge of the knife, scissors, or punch (which is in reality a miniature saw) may carry down some cancer cells and leave them in front of opened blood or lymphatic vessels. The punch may dislodge cancer thrombi by its pressure, or the cutting into cancerous tissues may tend to increase the malignancy of the cancer in the cases in which a radical operation does not follow at once. The use of a cautery in removing the specimen overcomes some of the theoretical objection, but the specimen has then to be somewhat larger to allow for the destructive effect of the heat along the margins. A compromise plan would be the use of the knife to obtain the specimen, and the light cauterization of the resultant wound surface to destroy loose cancer cells and seal the vessel openings. It is also recommended that the entire suspected tumor or ulcer, if small, be removed for the diagnostic microscopic examination, in order to avoid making an incision into it.

Apart from these general, theoretic objections to biopsy, there are others based on clinical experience. The clinician is frequently not sufficiently well-informed to know which part should be removed for the examination, nor has he the skill to do it well. Instead of taking a fair-sized section from the edge, comprising a piece of the tumor and some of the adjacent tissue, he has usually removed a few fragments haphazard from the surface of the tumor. It has not been his habit to give the pathologist a diagram of the lesion showing the site from which the piece was taken; rarely has he made a diagram of the removed segment to show in what plane the sections should be cut. The specimen has often been sent almost dried out; frequently it has been covered with blood or secretion that could have been removed readily at the time of the biopsy; and occasionally it has been sent in carbolic, lysol, or bichloride solutions instead of the usual formalin, even in alcohol, which would certainly make a frozen section impossible until the alcohol had been completely removed. Reports made upon immediate frozen sections of unfixed tissues are not dependable at best, unless unquestionably positive evidences of cancer are found. Errors in diagnosis have been most frequent, however, when the pathologist has attempted to make a diagnosis from unsatisfactory material, and this lack of caution on his part in so important a matter has been one of the surprises in cancer experience.

As a safe routine, it is suggested that the careful clinical examination and study to determine the nature and extent of the process be considered as of first importance, and that biopsies be limited to the irreducible minimum. They must be done according to the rules of the best teaching in cancer. Whenever it is possible, the frozen section examination should be delayed for 24 hours, to give time for the adequate fixation of the tissue in formalin before it is sectioned. Doubtful or negative reports should be verified by the examination of paraffin-prepared sections as soon as practicable.

A very unfortunate circumstance in cancer experience has been the finding of a number of instances in which several biopsies have been done on the same patient, all giving positive cancer reports. The resultant increase in malignancy made most of these cases hopelessly inoperable, a condition that would not have occurred if each clinician had realized the desirability of examining one of the original microscopic slides instead of making another biopsy.

A corollary to the advice concerning biopsy is the principle that all excised new-growths should be examined microscopically, no matter how small or how benign in clinical appearance. Many unsuspected early cancers have been found in this way.

CONCERNING THE ADVICE GIVEN BY THE PHYSICIAN TO THE CANCER PATIENT AS TO THE TREATMENT OF HIS CANCER

At the conclusion of the period of examination and study, the physician faces one of the most serious responsibilities of his practice, namely, the decision as to what advice he should give the cancer patient as to his treatment. He has two guides to help him: one is an adequate knowledge of cancer experience, so that he may know what each method of treatment has accomplished and how rational is its basis; the other guide is his conscience. Unfortunately, experience has shown that frequently neither of these guides has been consulted. Patients whose conditions seemed very favorable for cure have been treated by methods that not only could not cure them but that, in some instances, added considerable damage and greatly increased their suffering. Other patients of this class have been inefficiently operated upon, either by their family physician or by some surgeon of his or their acquaintance who may have been a competent general surgeon but who lacked the special training of fitness for cancer operations.

It would be very advantageous to the clinician if some medium existed, such as the office of a cancer society, where he could obtain an unbiased and correct judgment as to the value of the different methods of treating cancer, and of the competence and trustworthiness of the consultant to whom he purposed sending his cancer patient for treatment. Left to his own resources, he must remember that the first procedure in treatment marks the time at which that cancer patient has his best chance for a cure, sometimes his only chance for cure. It would be an added advantage to the patient if the clinician would then put himself in the patient's place before he planned his advice or his treatment.

PERIOD OF DIRECT TREATMENT OF CANCER

The period of direct treatment of cancer as here considered relates solely to the work of the surgeons and the radiologists, to whom cancer patients have come for radical, curative treatment. Methods that are still in early experimental stages are not considered. Discredited methods and quackery are not considered in this paper. A review of the records of the treatment of cancer gives no cause for satisfaction, but it brings out sharply the need of specialization in cancer.

In the unsuccessfully radiated cases, the outstanding fact from the patient's standpoint is that, in the present state of radiation knowledge, this form of treatment for the cure of cancer should be attempted only by the experienced radiologist and not by every roentgenologist or other clinician who possesses an X-ray apparatus or some radium. The much-advertised radium rental service, which puts the actual application of the radium into the hands of the totally inexperienced clinician with the directions for its use issued from the office of the radium renting company, is a pernicious practice.

In spite of the many excellent studies of the physics and the biological effects of radium and the X-ray, covering many years, the mechanism of the action of radiation in destroying cancer is not yet understood. No one can predict with fair certainty how the tissues will react. There is still no dependable biological rule for determining the dosage that will be effective against cancer and will not be unduly destructive otherwise, and no one can tell what is happening during the radiation. The wide difference of opinion between those who believe in giving heavy doses of short duration and those who give minimal doses over a long time duration, evidences the fact that the essential factors of radiation are still in the experimental stage. The entire field of radiation remains in the haze of uncertainty, and there is no change in the unhappy procession of uninfluenced cancers, partly but stubbornly resistant cancers, severely damaged tissues with persisting cancers, and cases showing severe progressive secondary effects from radiation.

Aside from any question of the evaluation of radiation as a curative measure against cancer, it is suggested that the radiologist would do well to realize when his treatment is producing no benefit, and to discontinue it before the fruitless delay and possibly extensive radiation damage make it impossible to apply surgical measures. This should be evident to him within six weeks. Likewise, the unsatisfactory results of the radiation of cancers that have recurred after an apparent cure by radiation should lead him to discontinue the second course of radiation at an early time, if no considerable progress is being made. In order to give a better understanding of values in cancer progress, it is also suggested that the radiologist become better informed as to what can be accomplished by efficient cancer surgery, and omit his frequent statement that surgery in cancer is a failure. It would be helpful, too, if his reports concerning the results of radiation were marked by absolute frankness and candor in admitting the numerous cases of complete failure, intense suffering, and severe damage that followed the radiation treatment.

Cancer surgery, as generally observed, has not reached the limits made possible by the advances in cancer studies, and the surgeon himself seems to be the weakest spot. He has failed to realize from the start that in cancer work he faces a far different problem than he does in general surgery, and that he needs to view cancer surgery from the cancer angle. As requirements for cancer surgery, in addition to the usual technical knowledge and skill, he must have an adequate specialized cancer knowledge concerning both the disease and the special features essential to the technique, and he must have the temperamental qualities that will fit him to do this work faithfully and well.

Briefly stated, the outstanding points of weakness in his knowledge of cancer as a disease, as these have appeared in retrospect, have been (1) his lack of contact with the progress in cancer research, (2) his imperfect evaluation of the degrees of malignancy, (3) his failure to follow through the natural course of cancer cases, to determine the probable extensions and regional metastases in each case, (4) his repeated failures to retrace the path of regional metastases so as to find small and silent primary tumors, and (5) his failure to interpret correctly the frequently associated inflammatory conditions.

The work in cancer research has established the basic facts concerning cancer, and in addition to purely academic considerations, includes many experiments and studies that bear closely upon the clinical problems of human cancer. Unfortunately, these articles are not widely read by surgeons in general, even when published in surgical journals, and many crudities and errors continue.

In the evaluation of degrees of malignancy, the cancer of small size is too frequently viewed lightly, as a less serious condition, regardless of its malignant potentialities in extension and metastasis. Too few surgeons realize the increased malignancy of cancers occurring in younger people or in organs that are functioning actively (such as the breast during pregnancy and the period of lactation); too little stress is laid upon the duration of apparently less active cancers with their almost certain, even if undetected, extensions and metastases; and the effect of previous irritating treatment or earlier, incomplete operations is not given the serious weight in judging the degree of malignancy that this serious factor deserves.

The tendency of cancer to produce extensions and metastases is in the primer of every medical student, yet, even in the best surgical clinics, cancer excisions have often been very limited in extent, and time and again, the primary tumor alone has been the object of surgical attack in areas in which the occurrence of regional metastases is considered a characteristic. There can be no justification for failing to remove such regional lymph nodes on the ground that they usually appear late in that location, or because the surgeon could not palpate any enlarged or hard nodes. If every medical student knows that metastatic cancer begins as a microscopic focus, the surgeon must know and remember it as well, particularly since experience must have taught him also that the chances for cure in cases in which cancerous lymph nodes have become large enough to be palpated are only about 20 per cent as good as when they are removed before gross evidence of cancer can be noted.

Equally blind has been the failure to direct the clinical eye backward along the course of the known lymphatic channels, when the lymph-node tumor is the first clinical evidence of cancer, and to find the hidden primary tumor—a surgical error most common with metastatic cancers in the neck and frequent also with those in the axilla.

Thus far the criticism has been that the surgeon tended to underestimate the magnitude of the cancer in given cases; but, on the other hand, his lack of an adequate cancer knowledge has occasionally led him to error in the opposite direction, and he has withheld operation in cases still favorable from the cancer standpoint, because he has misinterpreted associated conditions that were purely inflammatory in character. This has occurred most frequently in cases of gastro-intestinal cancer associated with inflammatory exudates and in cases of cancer of the uterus associated with fixation from old inflammatory processes. Similarly, enlarged lymph nodes that had the clinical appearance of metastatic cancers have often shown simple inflammatory changes alone, on examination.

Equally important with the need of a better knowledge of cancer as a disease, is the need of a considerable degree of improvement in the technical knowledge of cancer surgery. Nearly all the cancer surgery has been done in general hospitals and by general surgeons, and cancer surgery has lost in effectiveness because its own special requirements have not been met. These special requirements are that the cancer should be completely removed, that none of it should be re-implanted upon the fresh wound surface, and that no cancer emboli should be pressed into the blood or lymph stream during the operation.

The tendency in general surgery is to be conservative, and the ordinary non-cancerous excisions have been limited to the minimum, in the knowledge that the natural defensive and reparative powers would usually be able to take care of the small remnants of diseased tissue that had been overlooked; or, failing this, that secondary operations could be done with safety. The mortality from unremoved cancer is practically 100 per cent. Incomplete operations, by stimulating cancer growth, tend to bring on conditions that are worse than the original process, and to result in increased suffering and earlier death. Secondary operations for recurrent cancer have seldom resulted in permanent cure. With these experiences as well understood as they have been for many years, it is surprising to find how many surgeons have failed to plan and carry out the logical cancer procedures in the important first operation, and, even more, that any surgeon would find satisfaction in the feeling that he "got most of that cancer out." Cancer surgery needs to be specialized. Standard operations are needed for each cancer region, and it should be recognized that the maximum extent of excision should be applied even to the most favorable cases. A reduction in the scope of the excision is permissible only when the number of cured cases has reached nearly 100 per cent. In isolated cases, unavoidable conditions may compel a limiting of the operation, but it is inexcusable to have the thought of the cosmetic result or related smoothness of wound-healing jeopardize the thoroughness of the operation. Conversely, as each recurrent cancer case comes under observation, the site of the local or regional recurrence should be noted, in order that these areas may be included, if possible, in future standard operations for these respective regions. Specialization will mean not only that each cancer patient will have a better primary operation, but also that many will be saved by operation, whose condition would be considered inoperable by the average surgeon.

Cancer surgery is essentially an anatomical dissection, and it requires a considerable length of time to be done completely and carefully. It is preferable, therefore, that it be done in operating rooms that are not constantly in demand for other types of surgical operations; it is equally essential that the surgeon and the public should realize that the short and swift cancer operation is an evidence of poor cancer judgment.

As a means to thoroughness and efficiency, a specialized cancer training would suggest that a plan of operation be prepared for each individual cancer case, which, like a plan of campaign, would begin with a full knowledge of the clinical status, of the extent of the cancer field, and of the anatomical landmarks, and would have so definite an idea of what is to be done that the minimum would be left to chance. The plan need not be written, but a few diagrams and brief notes will be convenient and wise safeguards against the uncertainty of memory. Every operating plan in cancer will have two separate parts: the first relating to the removal of the cancer; the second dealing with the problem of the repair of the damage thus produced, and their order in thought and in the procedure must remain in this sequence of first and second, so that considerations of repair may never limit the scope of the extirpation. Anatomical landmarks are indispensable guides. In regions where these might have become obscured or lost, it is recommended that black silk marking sutures be inserted, and that the ends of these threads be left long, if necessary, to insure their ready recognition. This aid is especially valuable in operations upon the mouth and throat and in gastro-intestinal operations.

A factor of great concern to the cancer specialist, which is seldom considered by the general surgeon, is the ever-present danger of the re-implantation of cancer on the fresh wound-surface during cancer operations. Many recurrences are probably referable to this offspring of a careless technique, and it deserves earnest emphasis. To insure thoroughness and to prevent re-implantation, all cancer operations should be block dissections and the cancer field should never be crossed. Whenever fascial planes surround the suspected tissues, these should be carefully removed with the mass, so that an unbroken envelope of fascia may give the assurance that the excision has been complete, and that no part of the cancerous tissue has been torn off and left in the wound. Other outstanding danger points are evident in the careless use of local anæsthesia, in ulcerated cancer surfaces, in the unskilled use of surgical instruments, and the inadvertent incision or tearing into cancerous tissues.

If local anæsthesia is to be used, the path of the needle must be kept widely distant from the cancer, especially in the deeper regions, to avoid puncturing the tumor. If the hollow needle carries along any cancer cells and these are injected with the novocain solution into healthy tissues, a perfect cancer implant is produced.

If the cancer surface is ulcerated, cancer cells may readily be broken off during the hurried wiping away of blood with gauze sponges. To minimize this danger, the exposed surface is cauterized with the Paquelin or soldering iron cautery and covered with a gauze pad firmly fixed in place. A careful second disinfection of the surrounding area is then added.

The surgical instruments that are most likely to produce re-implantations are the sharp retractors, the mouse-tooth thumb forceps, artery clamps (hæmostatic forceps), transfixion needles, and ligature carriers. Sharp retractors should never be used on the cancer side of the field and it is desirable to use them as little as possible on the healthy side, so as to keep them out of easy reach and inadvertent harmful use. Mouse-toothed surgical thumb forceps may not be used indiscriminately on the cancer side and on the healthy side, but, once used on the cancer side, they should be kept for that region. Hæmostatic forceps should never be taken from one part of the wound for use in another part, because they might have grasped cancerous tissues and an implant could result. All removed artery clamps must be boiled again, before they are used a second time in the operation. In the use of transfixion ligatures and ligature carriers great care must be used to avoid entering the cancer field.

Cancer tissue may be inadvertently exposed during the operation by cutting or tearing into it, or by wiping off the surface covering. The exposed cancer surface will remain a menace unless it is cauterized or packed with an alcohol tampon: the surrounding region should be wiped with alcohol, and the knife, scissors or other traumatizing instrument must be reboiled.

An unavoidable risk of re-implantation arises when it becomes necessary to divide the radical operation for cancer into two or three stages separated by intervals of one to two weeks. Under these conditions cancer judgment takes precedence over surgical judgment.

As a working principle, the primary tumor should be removed in the first procedure, to prevent the entrance of cancer cells from this tumor into the wound territory of the regional lymphatics, and to prevent metastases *via* new collateral lymph channels that will not be known to the surgeon. If the primary tumor is necrotic and if there has been considerable inflammation around it, the removal of the primary tumor as the first step will result in improved operating conditions in the regional lymphatic areas before these are dissected, and if postoperative complications compel delay, it is less dangerous to wait if the primary tumor has been taken first. These cancer considerations outweigh the undoubted technical advantages of removing the regional lymphatics, dividing nerves, and ligating the main blood vessels as the first procedure, which simplify the later removal of the primary tumor. When such division into stages must be done, the safest sites for crossing the cancer field must be selected, and this is a problem for the anatomist.

In addition to the need of thoroughness in extirpation and of care to prevent the re-implantation of cancer cells, it is necessary here again to guard against rough handling of the cancerous masses that are being removed lest the undue traction or pressure upon the tumor set free dangerous cancer emboli. As a measure of safety against this possibility, it is advisable to secure the large veins that come from the tumor as early as possible, and to dissect the lymphatics before the tumor itself is attacked.

Before operations for cancer, the surgeon takes pains to note the limits of extension so far as these are clinically determinable, but for some unexplainable reason he has consistently failed after cancer operations to seek the aid that the pathologist could give him in determining these limits by microscopic examination. Tissues that have been removed have been sent to the laboratory without any marks of identification as to which part was top or right or left, and without any marks to show the relations of different parts of the apparently formless mass to the limits of the dissection. The routine placing of black silk threads—one thread, two threads, three threads or more, at various landmark points on the tissue during the dissection, accompanied, if possible, by a simple diagram—would enable the pathologist to unfold the specimen properly and give valuable information as to extensions and metastases, which would show the need of additional excisions if necessary. It is advantageous to have an assistant examine all such removed tissues before the wound has been closed, to determine by gross inspection if the line of excision has gone sufficiently far beyond the visible signs of the growth so that an immediate revision of suspected areas may be done. Similarly, if the laboratory report shows cancer at or near one of the landmark guides, it is advisable to have a second operation follow early, instead of waiting until gross evidences of recurrences are noted clinically. The surgeon will learn much from the habit of examining such removed tissues after operations, and this, with his later personal examination of the microscopic slides, will aid in the better recognition of tumors and metastases clinically.

Specialization in the study and treatment of cancer has thus brought out many facts in cancer knowledge and cancer technique, but one of the most difficult problems in the effort to improve cancer surgery remains in the need to regulate the chief human factor, namely, the personal qualifications of the cancer surgeon. Unfortunately, this is one of the most important requirements for progress in the treatment of cancer. It will not be difficult to find men with the requisite surgical ability who can be specially instructed in the knowledge of cancer, but it is beyond the power of education to add the equally indispensable temperamental fitness to qualify them for the work in cancer. This temperamental fitness is evidenced first in a broad vision in planning these extensive operations, in the courage to undertake them, and in the patience and persistence to carry them out as they should be done. There must be the minimum of annoyance over technical difficulties, which constantly arise, and over difficulties associated with the anæsthesia, or poor assistance, or imperfect light, or defective instruments and materials. Personal comfort must be sacrificed in many ways, and if failure comes in spite of every effort, there must be no discouragement to paralyze effort in succeeding cases. The cancer surgeon needs to recognize the magnitude of the work to be done and needs to be prepared to do it well. He will not be disturbed by the length of time it takes, or by the size of the field of operation. With this freedom from anxiety added to a well-controlled technique, he can concentrate his whole attention upon the cancer requirements of his work. Large as this task may seem at first, it will become progressively simpler as purposeful observation and study improve and simplify his technique.

Weissmann has epitomized the experience of biological evolution as trying and failing, trying and failing, and trying and succeeding. Cancer experience is still mainly trying and failing, largely because physicians do not make use of the cancer knowledge available at the present time. Specialized cancer teaching along the whole line of examination, clinical study, the true limitations of radiation, and the best practices in cancer surgery would result in an immediate gain in cancer progress; and it would furnish a safe and dependable procedure for the future until, if ever, a better method of treatment shall be found.

NEWSPAPER PUBLICITY IN THE CONTROL OF CANCER

By HARRY C. SALTZSTEIN, M.D., Detroit, Michigan
Local Chairman, American Society for the Control of Cancer

WHEN considering mediums of publicity for a topic like cancer there is nothing which gives so great a return for the amount of effort expended as the daily newspaper.

Speaking before audiences—luncheon clubs, women's societies, etc.,—is of course more direct: nothing can take the place of the word-of-mouth appeal. But after the effort of arranging for the address, and the evening or noon spent, usually 100 to 500 persons at most will have been reached. Though the number of lecture halls and audiences before which cancer could be discussed is legion, there is a tendency toward the falling off of lecture attendance; the radio and automobiles are responsible. Billboards, motion pictures, magazine articles and advertising are effective, but may be very costly and are similarly time-consuming.

But everybody reads the newspaper. A busy metropolitan newspaper may have a circulation of from 100,000 to 1,000,000 and a brief, well-written article has the possibility of reaching that many readers. A ten-minute talk over the radio will reach just as many persons as a newspaper article will, but here also, there is a tendency toward the putting on of more musical programs and fewer informative talks.

PUBLICITY IN THE CANCER CAMPAIGN IN DETROIT

Hence in the last cancer week publicity campaign in Detroit, we concentrated chiefly upon newspapers and tried to make the other features of the campaign conform as much as possible to the newspaper copy.

The campaign consisted of advance newspaper publicity, culminating in a two days' series of lectures and addresses by Dr. Francis Carter Wood on January 21 and 22, followed by free examinations for cancer at all Detroit hospitals from January 25 to 30.

During the entire period of activity (January 3 to 30, 1926) the three daily newspapers of Detroit carried 831 column inches of news about cancer. This is equivalent to more than 4 full pages. It represented 66 individual items and photographs and contained most of the information about cancer deemed advisable for the public to have. To get busy metropolitan newspapers (the total daily circulation of these papers is 800,000) to devote this much space to such an ordinarily uninteresting topic as cancer, a few principles of newspaper publicity must be borne in mind.

THE CO-OPERATION OF EDITORS

Editors and publishers will gladly coöperate in a movement of this sort. A personal visit to the editor or publisher will do much toward giving "cancer" priority as news copy. The organizations back of the movement—the entire local medical society, all the hospitals, the Board of Health, the American Society for the Control of Cancer—collectively warrant publicity and as such should be mentioned. A "drive" of such concerted backing demands news space.

One paper with a large editorial staff may assign a special feature writer for the entire period; another will donate advertising space and prefer to have the news copy laid on the city editor's desk. These individual peculiarities of papers and editors should be learned. The city editor should understand the purposes of the movement, for all of the news items pass through his hands.

CANCER NEWS MUST BE MADE INTERESTING

It must be distinctly appreciated, however, that newspapers are commercial enterprises. As such, they are not conceived primarily as mediums for the betterment of human welfare or for popular education, but must print what their public wants to read. Though their audience varies, some papers catering to much higher intellectual levels than others (even as communities vary in their intellectual level), it is a general rule that what the vast majority of persons want to read is a reflection of their own emotions. The two cardinal human emotions are love and a fight. Hence it is only natural that sex problems, divorce, human interest tales, crime and adventure, fill so much of the news columns. The unusual, a debate, an issue, a fight, something about to happen, are front-page headlines, but the later explanation, the after-results, scientific data and reports (unless they can be made into a discovery) receive a brief inside mention. The former contain appeals to human emotions, and people want to read of them; the latter contain no issue or appeal and, even though the intrinsic facts are more important, the news value not being there, they cannot demand space. Newspapers are frequently criticised for this and the reason why the flamboyant heading is given to the strike or denunciation and only insignificant inside mention is given the peaceful settlement or the apology, is not understood.

To illustrate: the *Survey*, generally alive to all social issues and processes, had this to say May 15, 1926:

> Only a few years ago the men's clothing industry in New York was the scene of innumerable picturesque strikes. There were huge picket lines, there were injunctions, there were exciting encounters between police and strikers . . . . Camera men and reporters were on the job. For industrial welfare is news.
>
> Three weeks ago some six hundred clothing manufacturers and workers joined in a banquet to celebrate the second anniversary of what is known as the Impartial Machinery for the Adjustment of Labor Disputes. The chairman reported that in these

> two years some thirty-seven hundred cases had been amicably adjusted. He had had to decide only sixty-seven of these, and in each instance the contending parties drafted the decision. To those who are familiar with the intricate problems and emotional intensity of the clothing industry and workers, this was a remarkable and thrilling record of constructive achievement.
>
> But this was not news! There were no press photographers present, no camera men. Of all the New York papers, the *World* alone carried a perfunctory notice under the heading "Clothing Workers Enjoy Big Dinner."

The *Survey* then asks:

> Have thirty-seven hundred disputes settled peacefully, constructively, intelligently, no news value? A single dispute so stupidly handled that it results in a strike or a lock-out with all the melodramatic accompaniments of jungle warfare—to that the press gives endless first-page headlines.

The query answers itself. Peaceful settlements are not news and cannot demand space. Jungle warfare in the streets of New York will be read by everyone. The intrinsic importance of the facts do not determine the amount of news space obtained. The public taste rather than the newspapers determine what should go on the front page. The success of the Hearst enterprises is based upon an accurate reflection of the public mind—that quarter-page divorce pictures, the double page of funnies, the sporting extras, human-interest story features are what a large part of the public want to see and read. The successful news story must have a fight involved—the *Shenandoah* fighting the elements, for example. It is preferable that it be a personal fight (Red Grange *vs.* the entire football world); that the combatants be well known (Bryan *vs.* Darrow), or of such attainments or human interest that the public can quickly know them (Col. Mitchell's attack on the Army aviation policy), and, finally, there should be a marked element of suspense (Floyd Collins alive or dead in the Kentucky cave?).[1]

CANCER MUST BECOME AN ISSUE

The practical bearing of all this is that cancer, to be news, must become an issue. "Cancer Week Drive" and "Medics to Fight Cancer" will supply the human-interest feature. Much more information about cancer will then be printed if everyone knows that cancer week is a short time hence—if there is the suspense of something about to happen—than if the same amount of data were submitted without being clothed with any issue. Then, when the event arrives, it has had so much heralding that it is taken seriously as an important happening.

It must be fully appreciated that popular interest cannot be held for any great length of time. Throughout the course of a year, very few items hold the headlines for more than a week—the public tires. The average time spent on the entire perusal of the morning paper is 15 minutes; of the evening paper, from 20 to 25 minutes. The publicity must lead up to a week of considerable activity, and then must stop. The advance articles will be best read if not more than a

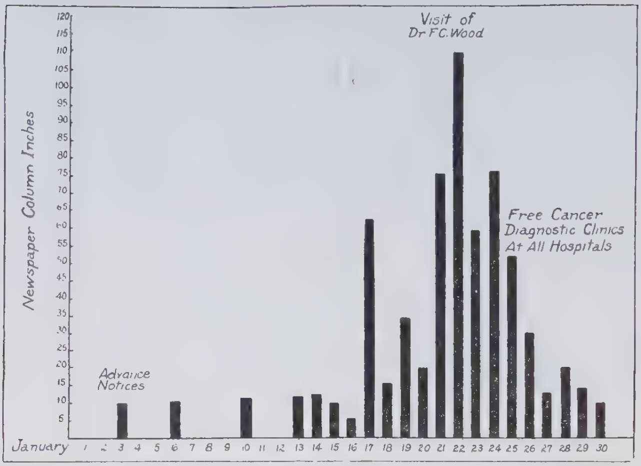

Fig. 1. News space devoted to cancer during cancer week in Detroit. Each of the advance notices commands about the same moderate amount of space. During the week of Dr. Wood's visit cancer is intensely active news. There is then very rapid falling off in space obtained even while the hospital diagnosis clinics are being held. (Reprinted from J. Am. M. Ass., 1924, lxxxii, 2140.)

quarter to a half column in length (they generally will not be accepted if longer). During the week, if an authority arrives to deliver a series of talks on cancer, the campaign takes on the aspect of a personal encounter with a well-known individual involved. Cancer then has all the news features of a big story and will easily be a front-page topic of one, two, or three columns for one, two, or three days. Dr. Francis Carter Wood's addresses were given an immense amount of news space under such captions as "Noted Cancer Expert Arrives Today," "Foe of Cancer Flays Quacks," "Fight on Cancer is Described," etc. The opportunity can be taken to give definite and detailed instructions about the disease, which otherwise would be very difficult to make into news. After this, the news value is gone. A summary of our results was given to the papers ten days after the hospital clinics closed. Although this represented the gist of the campaign and was copied in medical periodicals, it was now only scientific data or records and therefore had little desirability as news. It commanded a small amount of space (Fig. 1).

THE TIME A PSYCHOLOGICAL FACTOR

The time of the main drive must be carefully chosen so as not to compete with any national or local campaigns, community drives, Christmas news, etc. There are seasons when news is full, when people are apt to read more, and other

---

[1] Charles Merz. What makes a first-page story? New Republic, Dec. 30, 1925, p. 156. These illustrations are taken from the most successful news stories in 1925.

seasons when news is slack. The fall of the year is an active time, full of interest, but many cross-currents of news (politics, football, community drives, etc.) may interfere. In December everyone is busy with Christmas shopping. January or February is a fine time for a "cancer week"; interest is active, and the above issues are all settled. Toward the latter part of spring, programs are apt to become listless, people get tired of lectures, and commence looking toward the open spaces. Summer is often a slower time as regards news, and more space can be obtained, but many persons are away, and general interest is dragging.

If on any day there is a big news story—a hurricane, an unusual murder, a political upheaval, etc., the carefully prepared cancer copy may very likely be abbreviated or scrapped. The city editor will not care, however, if the same copy, clothed in a slightly different heading, be resubmitted to him the next day.

The success of the campaign will depend to a great extent upon the amount of advance publicity obtained. This also cannot be spread over too long a period; three or four weeks, of a brief announcement two or three times a week, is enough. Each of these must have a different news value paragraph. The more separate and distinct news items one has, the more information about cancer will be printed. A personal interview by the health commissioner or hospital superintendent; "Women's Club to Hear Lecture"; further announcements of plans; "Local Cancer Deaths Last Year," etc., are samples.

THE CHOICE OF MATERIAL

Because of these technical points, it was found very helpful to have a newspaper reporter on the staff of the campaign committee at a small salary. At the height of the campaign, there will be a demand for so much cancer material that it is best to have several articles on hand already prepared. The only way to avoid over- or under-statement or inaccuracies is to give out nothing but typewritten copy. The reporter, feature writer, or editorial desk can rewrite it into news and headlines.

Just exactly what should be told to the lay public demands very careful consideration. The burden of the campaign is to be that "foreknowledge means control," and if complicated figures and statistics or controversial points are discussed, no clear notion of how to control a possible cancer mortality will remain in the mind of the reader. Long discussions about conflicting theories of etiology, specialists' arguments about treatment, conflicts about heredity, or descriptions of the terminal ravages of the disease will not help anyone to recognize his possible cancer sooner. The information of most value to the public is the detailed description of cancer's early signs and advice concerning its prevention. The plan we followed is here outlined. During the advance notices (January 3 to 17), figures of cancer's prevalence and increase, local incidence, i. e., the reasons for the campaign, were given, and sundry bits of general information about the disease interpolated for general interest. The Sunday (January 17) before the main campaign, a column article was printed about etiology, pathology and life history of cancer; during the next few days (January 21 to 25) Dr. Wood's speeches were published, followed by (and it was repeatedly reiterated that this was the crux of the whole affair) four articles on the early signs of cancer, with a brief discussion of what constitutes proper treatment. The papers were asked to print these articles serially, with a special caption encouraging people to read them, stating that the hospital examination would be only for persons suspecting these conditions. Much of this material would not have been taken except at the height of a campaign.

These articles on early signs need not be too extensive. When one has discussed skin lesions, breast tumors, mouth conditions, bleeding and gastric distress, one has emphasized the main points in popular education. Medical literature is full of conflicting statements concerning cancer and what constitutes early signs. The advance publicity has led the public to expect, and they are waiting for, expert advice, so that sources of information must be carefully chosen. The two handbooks of the American Society for Control of Cancer, *What Everyone Should Know about Cancer, a Handbook for the General Reader*, and *Essential Facts about Cancer, a Handbook for the Medical Profession* (both 1924) are authoritative, and the description of early signs is concise and complete. The book of Dr. Charles P. Childe (E. P. Dutton & Co., 1925), *Cancer and the Public*, contains much useful general information frequently clothed in very optimistic language. The article on *The Prevention of Cancer*, by Dr. James Ewing, delivered at this Mohonk meeting, with the discussion which followed, can also be used almost in its entirety.

There will be a tremendous interest in skin lesions. In addition to the descriptions of the beginnings of skin epitheliomata, the information about moles, warts, pigment spots, etc., should be very full and yet concise, and should be authoritative. The descriptions in the handbook cannot be improved upon. The statement about breast tumors is simple. A discussion of uterine bleeding can during the height of the drive be camouflaged into language acceptable for popular print. Gastric and intestinal cancers are as difficult to warn against as they are to diagnose early. The most that can be given is a description of persistent indigestion, with a warning to be examined and a statement of what constitutes an adequate examination, word and phrase cautioning against undue alarm. In mouth cancer, emphasis should be placed on conditions which may develop into cancer, i. e., papillomata, leucoplakia, fissures, broken teeth or plates, smoking irritations, etc. A few brief sentences about rectal and urinary bleeding are sufficient.

On the basis of our experience with the free hospital clinics, the response can be predicted. There will be many skin cancers discovered. A large number of women with breast lesions, often requiring careful differentiation and diagnosis, will seek advice. A fair number of uterine lesions, chiefly carcinomata and fibroids, will be discovered. Many irritated mouth conditions, the eradication of which will prevent most of the cancer in the mouth, will be found, and a few buccal cancers. Concerning gastro-intestinal lesions, because of the indefiniteness of the advice that can be given about gastric lesions, and the complete examination necessary for a diagnosis, few abdominal cancers were discovered. This is a disappointment, for this group comprises over one-third of all malignancies. A few rectal cancers will be discovered.

Having seen these possibilities of mass publicity over a short time, we were anxious to see if similar methods could not be utilized on a smaller scale but more continuously. Furthermore the cancer week demonstrated the need of more systematized advice to those made suspicious by the publicity, and no attempt at organization for treatment had been made. One of the expressed principles of the American Society for the Control of Cancer is to foster better grouping of cancer patients. Consequently we have just inaugurated a cancer clinic at Harper Hospital which will group cancer cases in the hospital, and try to encourage early diagnosis and treatment by publicity. It is being run by a few interested, with the chiefs of the various departments as consultants, so that the best group opinion of the hospital is available. Although we started this with misgivings, because the publicity must specify one institution rather than the county medical society, the newspapers did the same thing we had seen them do before—drove in many persons who had not thought much of their condition until they "saw it in the papers." One of our first patients was a woman who had been told two years ago, at one of the cancer week clinics, to have an operation for cancer of the breast. She had not done so, had thought of coming for examination during the last cancer week examinations, but finally came only after seeing the publicity announcing the Harper Hospital cancer clinic. During all this time she had seen no medical adviser. Our further success, as regards publicity as an adjunct to medicine in cancer control, will depend upon how well we can make a drab clinic, functioning continuously, into news.

REFERENCES

SALTZSTEIN, H. C. Publicity in cancer. J. Am. M. Ass., 1924, lxxxii, 2140.,

SALTZSTEIN, H. C. Practical value of newspaper publicity in control of cancer. J. Am. M. Ass., 1926, lxxxvii, 347–349.

DISCUSSION

DR. GEORGE A. SOPER, New York City: Dr. Saltzstein has described an effective way in which to put the essential facts about cancer into the minds of great numbers of people, and in his description of the newspaper work connected with a "cancer week" he has told many useful as well as amusing things. No one in all the vast territory of North America, over which the operations of the American Society for the Control of

Cancer extend, has done better work in this particular field than has Dr. Saltzstein, and he may be looked upon as an authority upon this subject.

The theory upon which such intensive educational work as cancer weeks is done is plainly shown in Dr. Saltzstein's paper. There is value in the suddenness with which the subject of cancer and its control is brought to the popular mind. Every element of dramatic force is employed in bringing the question, first gradually and then rapidly, before the public. Mindful of the fact that intense interest cannot long be sustained, the educational work is maintained for a brief interval only. It then suddenly disappears altogether. The result of the enterprise, interestingly enough, is apparent in the number of cases of cancer which are brought to the attention of the physicians. We have a definite statistical measure of its success.

Cancer weeks have been held in all parts of the United States. At one time they were held simultaneously throughout the country. Later, they swept the land in the form of regional campaigns in which one group of states after another undertook them.

It was easier a dozen years ago, when the American Society for the Control of Cancer was organized, to manage a cancer week, than it is today, for from all parts of the country word has been received that the people are tired of "weeks" and "drives." The idea, adopted in many fields of health work, has been "done to death."

Dr. Saltzstein's campaign at Detroit has been carried on, therefore, under some disadvantage, and its success is all the more creditable.

It will be observed that some stimulating things were said during the cancer week at Detroit. Some of the newspaper articles were startling in their announcements. We must suppose that the orators and writers connected with the undertaking were a little carried away by the enthusiasm of the occasion.

Misstatement, either on the side of too much optimism or on that of pessimism, is capable of doing the subject of cancer control serious harm. In the statement of principles and policies adopted December 5, 1923, by the American Society for the Control of Cancer to serve as a chart in conducting its campaign against cancer, it is clearly stated that "the publications of the Society should be the most stimulating and practical which it is possible to produce. Above all, they should be accurate." Again, the statement declares, "The Society should be the foremost authority in the world on the control of cancer. Its office should be prepared to formulate statements and statistical expressions of the most unprejudiced and reliable character." Again, "No matter for whom printed matter is intended, misleading statements should be avoided. For the Society, optimism is only appropriate when supported by accuracy of statement. Undue hopefulness as to the efficacy of surgery, radiation or other treatment, or as to the outcome of the Society's efforts to reduce the mortality from cancer, is certain to lead to disappointing consequences. This applies not only to the Society's publications, but to all statements made in the Society's name, be they written or oral."

In order that persons who speak in the Society's name shall speak accurately, physicians and others who wish to make public addresses are furnished with information which has been compiled especially for their use. For example, there is the book intended for physicians, called *Essential Facts about Cancer.* There is the little book called *Suggestions for Popular Talks on Cancer* (a guide containing not only facts but lectures and addresses to show how they may be employed), and there are statements which are issued from time to time by the national headquarters on the subject of statistics.

There is no reason whatever for anyone to give misinformation on the subject of cancer, providing he wishes to equip himself with the facts. It is quite unnecessary. The truth is startling enough. That speakers generally adhere closely to the Society's doctrine and hold well to the instruction given them is proved by the thousands of newspaper clippings which come to the Society's office from all parts of the United States where addresses on cancer control are made.

A number of persons have spoken on the subject of fear and cancer, and it may be of interest to those who are present at this meeting to know the position which the American Society for the Control of Cancer has taken on that important subject. In its statement of principles and policies appears the following: "Up to the present, the Society has sought to accomplish its purpose by showing the benefits to be gained by following its advice. It is questionable whether this optimistic attitude furnishes the strongest motive force which it is practicable to employ. It may be worth considering whether it is not desirable to tell people not only the hope which lies in prompt and proper action, but the fatal consequences of delay."

Fear operates in many and curious ways. Some persons who believe they may have cancer do not go to physicians to make sure, because they fear that they will be told they have that disease. Others, with the same degree of fear go promptly, lest delay may add to their danger.

Fear is capable of being utilized, perhaps, in a far more effective manner than hitherto in the control of cancer, for it is an instinct which may give rise to a wise course of action, as well as to a foolish one. It is not necessary for us to think only of senseless fear when the word is mentioned. Fear is often a very sensible and useful emotion to possess. It is of value in guarding us against many of the dangers of everyday life to which we would otherwise fall victims. The person who knows that the only hope of cure in cancer lies in early and skilful treatment, and who consequently goes to a physician upon the first appearance of the danger signals, has a sense of fear which is well worth while.

The instruction which the American Society for the Control of Cancer gives has always been called a message of hope. The theory underlying it is that the prospect of cure which can be held out affords sufficient inducement to anyone to follow the advice offered. I am by no means certain that the average man or woman holds such a gloomy view of cancer as to look upon that disease as necessarily fatal, and I think I shall some day believe that a little wholesome fear—just enough to get people to go to the physicians in time—would be a good thing to instil into the public.

In a personal correspondence numbering several thousand letters, I have noted only one case of cancerphobia. That was in a woman who insisted upon being told that she had cancer, and was hunting around continually to find a doctor who would fall in with her idea. Before her mind settled upon cancer, she had been consumed with the notion that she had tuberculosis and before tuberculosis, heart disease.

THE RELATION OF THE GENERAL PRACTITIONER TO THE CANCER PROBLEM

By HOWARD LILIENTHAL, M.D., New York City
Consulting Surgeon to Mount Sinai and Bellevue Hospitals, New York City; Professor of Clinical Surgery, Cornell University Medical School

THE subject which has been assigned to me and which is expressed in the title of this paper has not been quite fairly put, for one cannot possibly consider the attitude of the general practitioner toward cancer without regarding the attitude of the surgeon toward the general practitioner as well as toward cancer and also the attitude of the patient and his friends toward all three of the factors which have been mentioned—the surgeon, the general practitioner, and the disease.

Unfavorable criticism of treatment, after the fact, is uncharitable and altogether too common. Without knowing all that has happened from the time suspicion was first aroused until surgery was invoked, no one can place the blame for delay where it belongs.

In this discussion we will begin with the standpoint of the patient and then take up, in their natural order, the attitude of the practitioner, and, finally, that of the surgeon, toward the disease, and we shall then try to show how education in cancer can be of service through its influence upon all three of the human elements—patient, physician, and surgeon.

Since this malady may attack any individual, it is the public which must be educated instead of the person who already has cancer. His education will come by experience, often sad, sometimes otherwise. In a paper of this kind it is not necessary to describe the various manifestations which first arouse anxiety—the presence of a tumor or enlargement, or of an ulceration, or of some abnormality in function. We will merely assume that after days, weeks, or even months of consciousness that something wrong is present, the vague suspicion of cancer is aroused. According to the temperament of the individual, other days, weeks, or months will pass before a medical investigation is requested.

APPLIED PSYCHOLOGY AN IMPORTANT FACTOR

What the result of this inquiry will be, and whether or not the patient will secure the best chance afforded by science for the conservation of life or the prevention of distress or deformity, will depend upon the knowledge and tact of the one who makes the primary physical examination, and here applied psychology becomes an important factor. The family physician, who has long been intimately acquainted with the patient, has the best opportunity to guide him in the right path, setting in motion the influences which will enable him to take advantage of all that is known about the treatment of his condition. Timidity and cocksureness are equally to be condemned. The alarmist or the extreme optimist will often do harm instead of good for reasons too obvious to mention.

A careful feeling out of the patient's probable reaction to the truth which he must hear is the surest way to transmit evil tidings with the minimum of shock.

According to the degree of certainty resulting from the examination, the doctor may either be practically sure that he is dealing with cancer, or he may be almost convinced that the condition is a non-malignant one. In any event the case will probably be one to be treated by some surgical procedure, either radical or diagnostic, and it is most desirable that there should be as little delay as possible.

In managing a patient who is blessed with a calm and judicial temper, the mere logical statement of his case will probably elicit the suggestion from him that action be not postponed; and the way is then clear for the next step, which will be the consultation with the surgeon.

On the contrary, a stolid or slow-witted person cannot usually be approached in this manner. When it becomes clear that he does not take in the sense of what his adviser is trying to tell him, it may be imperative to use the method of the cudgel instead of logic or persuasion. Such a person will have to be told bluntly that he probably has cancer and that he will die unless an operation is promptly performed.

Still others are timid and flee from the truth at the first unwelcome hint. Or, vanity may be the influence which makes for procrastination or for insufficient operation.

I once knew a woman who refused to have a tiny epithelioma upon her nose removed because it would leave a scar and she was "fair to look upon." The neoplasm became ulcerated and its area slowly extended. She knew that the larger the present defect the greater would be the resulting scar, and so months and even years went by until, when I saw her, the entire face below the eyes was a raw ulcerated sore with tremendous destruction of the soft tissues; and then, when it was no longer possible to treat the case surgically, she begged for operation! All this was long ago. Perhaps she would have permitted the use of radium had this been available in those days.

THE RESPONSIBILITY OF THE PHYSICIAN

The responsibility, although in the main properly shifted to the surgeon, does not entirely end there. The physician and his understanding of the physical and temperamental side of his patient, and his knowledge of the latter's idiosyncrasies and possible coexistent conditions, such as chronic cardiac, pulmonary, or renal derangements, can throw many important sidelights upon the case which will do much toward smoothing the way before and after operation.

As to idiosyncrasies, we may cite sensitiveness to certain drugs, such as morphine, quinine, or mercury. Some of these peculiarities may be quite unsuspected by the patient.

With regard to morphine, I once had a narrow escape in the case of a man, himself a physician, who knew of his sensitiveness to this drug but kept this knowledge to himself because he feared postoperative pain. From the time before his operation at 9 a.m. until 5 p.m. he received a total of ½ grain of morphine. At 7 p.m. he was cyanotic and in a profound coma from which he was with much difficulty aroused, only to relapse into still deeper unconsciousness with slow shallow breathing which yielded only to long-continued stimulation. It was not until later that I learned that there had been a similar experience upon the occasion of a previous surgical procedure.

Calomel—the household remedy—given to one who is susceptible, may produce the distressing mouth condition known as salivation. The foul breath and the loosening of the teeth, and the disgusting metallic taste may persist for weeks, often much longer than the convalescence from the operation.

We have thus far assumed that the physician belongs to that enlightened class which, in principle at least, believes in the efficacy of the early and radical extirpation of malignant growths. It must be recognized, however, that not all medical men have the same confidence in the treatment of cancer by operation, even if it be what we are accustomed to call timely. They point with protesting finger to the long list of their unfortunate experiences with cancer treated by surgery, and perhaps, in contrast, they will tell of cases in which malignant disease has been present for many years, but in which its progress has been so slow as to be almost stationary, interfering little, if at all, with the routine of life. It cannot be denied that in subjects of advanced age a slowly growing cancer, without breaking down of the tissue, may wisely be let alone or treated by some method looking toward palliation or the prophylaxis of ulceration.

One of my patients, a woman of 82, was hale and hearty except for a scirrhous carcinoma of the left breast which she had had for more than ten years. At last the surface became reddened and open cancer was imminent. She then came to me for an opinion. Had it not been for the threatened destruction of the skin, I should have been inclined to advise against intervention of any kind, because, at the rate of growth manifested by the disease, there was little reason to doubt that she might finish her normal span of life without pain or even serious inconvenience from her malady. The threatened ulceration, however, made me determine upon operation. I removed the breast gland only, not wishing to place the patient's life in jeopardy by anything more radical. Local anæsthesia sufficed for this procedure. I followed the case for more than three years, when the patient moved to a distant state; up to that time she had remained well.

But in spite of the happy outcome in unusual cases, such as the one just mentioned, it must be remembered that it is not the exceptional case but the ordinary ones from which we gather the experience which marks the path of progress.

RADICAL AND PALLIATIVE OPERATION COMPARED

From the observation of a multitude of operators it appears incontrovertible that the treatment of cancer of the breast by radical surgery will promise a greater percentage of conservation of life and more relief from suffering than will palliation or incomplete operation. And yet, palliation has its own important field. One would treat a case of cancer very differently in the presence of fatal illness, such as the final stages of pulmonary phthisis, than when it occurs in a person of ordinary good health. Yet even here the times are changing, as is illustrated in the case of diabetes, until recently one of the gravest contra-indications to major surgery, but now, through insulin, robbed of much of its danger.

We need not stress the value of nerve section for the elimination of pain or of short-circuiting and similar procedures to relieve visceral obstruction, for these useful procedures are well known.

We can fully sympathize with the point of view of many practitioners who fail to be convinced of the efficacy of surgery in cancer of the viscera, notably of the stomach, for by far the greater number of these cases come to the operating table too late for clinical cure. This is particularly so whenever the site of the lesion is not at or near one of the orifices, for then the pain of obstruction either to the entrance or exit of the visceral contents is absent and there may have been no symptoms whatever referable to the diseased organ. When, for example, there is obstruction at the outlet of the stomach, the patient, being plagued by pain and vomiting, will often seek relief in time for a reasonable attempt to extirpate the cause of his distress. Yet there is no reason why a cancer of small size in the body of the stomach may not present even better conditions for operation than one of equal size at the pylorus.

If medical men in making up their minds about the status of surgery in cancer would take into consideration the late and often hopeless condition in which operation is attempted and would inform themselves upon the comparatively slight risk of operation in early localised lesions, more of them would "think cancer" when a case of indigestion presents itself, and consequently there would be earlier diagnoses and more success with surgery.

THE VALUE OF ENDOSCOPY

In malignant disease of the œsophagus this aspect is probably more clearly marked than in all other cancerous disease. Instead of early examination by endoscopy with the actual view of the interior of the entire organ and with the removal of specimens for histological scrutiny, these cases almost never come to the surgeon for an opinion until there has been such an invasion of the lumen of the gullet that complete obstruction is imminent. I would, in fact, venture to say that fully 95 per cent of gastrostomies for cancer of the œsophagus are performed for temporary relief instead of as a first step toward the removal of the tumor itself. And it is particularly instructive to regard the history in the case of the only successful extirpation of this kind. I refer to the classical one in the practice of Dr. Franz Torek. The point which should be stressed is that this patient, an elderly woman, happened to consult the surgeon primarily on the first appearance of her symptoms. There was no middleman.

But one can hardly blame the average patient for not seeking special advice for what at first appears to be a trifling indigestion or a hysterical obstruction to swallowing. Indeed, mechanical obstruction does not occur until later. The subjective symptoms of substernal pain or distress nearly always antedate true dysphagia. Very few physicians realize that endoscopy of the œsophagus, especially in early disease, is not a dangerous procedure.

The spreading of information on this matter is one of our sacred duties. It is better that a score of these examinations should be made with negative results than that one operable case should be overlooked. The objection of expense, which is an important element with many conscientious physicians, is hardly well taken, because if the patient himself were plainly told that this procedure would result in a diagnosis, few, if any, would be satisfied to continue in ignorance. The fees of specialists are on such a sliding scale that anyone except the desperately poor can afford them, and, of course, the pauper class is still less neglected because of the many charitable hospitals and clinics.

THE EDUCATION OF THE MEDICAL PROFESSION

To continue the discussion of the successes and failures of cancer surgery and how to carry the message to the medical profession in general, I shall quote some of the least promising aspects of the operative treatment, and then ask what we have which promises better results in cancer cases in the aggregate. The individual must always be dealt with according to the circumstances of his own particular case.

Inseparably connected with this discussion are certain other factors bearing on the subject from various angles. They will be noted in the following paragraphs which are set down here as a hint, a mere suggestion, of the kind of information which should be spread broadcast among those who lack confidence in surgery as the prime antagonist of cancer.

In a conscientious and painstaking twelve-year follow-up of patients with malignant disease, both carcinoma and sarcoma, Gibson[1] says, "No sadder report of the disheartening status of cancer surgery has come to our attention." This important contribution is recommended for perusal to all who are interested in the cancer problem. I fully agree in the use of the word "sad," but instead of the state of affairs being disheartening, I regard it as more in the nature of a challenge. For after all, Gibson's tables fully demonstrate the value of surgery, and they are worth all the labor and treasure which has been expended in their production. To be sure, the statistics which refer to the number of years after operation and the type and anatomical location of the lesions are most difficult to digest; yet one gathers that of 437 operative cases (many kinds of malignancy and surface as well as visceral "cancers"), 17 per cent are "known to be living," while in 136 cases without operation there are only about half as many reckoned in percentage (9 per cent) and these may be considered hopeless. The chances, with surgery, of remaining alive for a given period are double those without its aid in the same length of time. Many of the cases reported are fine examples of operative skill and surgical judgment with results brilliant in the extreme.[1]

---

[1] Ann. Surg., August, 1926.

When we see that 64 patients, or about 12 per cent, are living from about 1 year to 10 years after operation, including otherwise hopeless conditions such as bone sarcoma (patients living from 2 to 10 years without recurrence), we should certainly not cease in our efforts to bring about better statistics by more timely intervention.

There is but one avenue of approach to this most desirable consummation, namely, the education of the doctors—all of us. Take, for example, cancer of the gall bladder. Gibson gives the mortality as 100 per cent. Here, plainly, the problem is one of prophylaxis. There are usually stones in cancerous gall bladders, and it is highly probable that the irritation incident to their presence has much to do with producing the malignancy. In these days cholecystectomy for pain-producing lithiasis is common enough. The silent calculi are probably a greater menace; they should be diligently sought and the viscus harboring them should be removed.[2]

Two instructive pamphlets have been recently issued by the British Ministry of Health.[3] One is on the natural duration of cancer, by Dr. Major Greenwood, the other on late results of operation for cancer of the breast. The tables demonstrate the paramount importance of operating in mammary cancer before the lymph nodes are involved. We knew this before; but when we are shown that in cancer limited to the breast itself and treated by operation the survivors 10 years later are only 14 per cent below the normal average expectation of life, we must, as the reporter says, "regard this result with great satisfaction."

---

[1] The bulk of the work was done by Gibson, Lee, and Hitzrot.

[2] *Postscript note by author.* In advising the removal of a gall bladder which harbors silent calculi, it must not be forgotten that we have to deal with the possible, though remote, danger of mortality from the operation itself as against cancer development in these cases. According to necropsy figures which I hope to supply at some future time, the impression is that the proportion of cancer incidence as a result of these silent stones may be not greater than that of mortality in the operation of cholecystectomy.

[3] Brit. M. J., August 14, 1926.

From the evidence given by Dr. Greenwood corroborating the observations of many surgeons, we cannot escape the conclusion, which is, of course, by no means new, that in operations upon primary cancer which are not accompanied by secondary growths in other portions of the body the chances of permanently ridding the patient of his disease are good.

THE NEED OF SEARCHING FOR METASTASES

It also appears reasonable to conclude that metastases which become manifest after an operation may have existed unrecognized before it. It can hardly be supposed that the presence of metastatic growths of minute, perhaps even of microscopic size, can be determined by any method known today. Indeed, it seems amazing that any cancer with neighboring lymph-node involvement can be completely removed by block dissection such as we make in breast neoplasms with axillary extension. The very fact that this has been successful in a considerable percentage of the cases is most encouraging.

Moschcowitz[1] reports that 40 per cent of his breast cancer patients who were alive from 4 to 5 years after operation had had definite glandular involvement and that this was the case in *all* the patients who lived as long as 9, 10, or 11 years.

We should not regard deaths from metastatic growths which were impossible to discover at the time of operation as the fault of surgical technique, although it is perfectly fair to reach this conclusion in true local recurrence.

For the good name of surgery, therefore, the most careful search for metastases should be made before giving a prognosis on the probable result of an operation. In addition to the usual physical examination, there should be roentgenologic exploration of the chest, since tumors of astonishing size may be present in the lungs without subjective symptoms.

Another common seat for metastatic tumors is in the skeleton, but these should rarely be overlooked, since local pain and tenderness are prominent features and X-ray pictures of the suspected bones will probably result in definite information. Manifestly, radical operations should never be attempted in such hopeless cases, although procedures for the relief of intolerable conditions, such as widespread ulceration of the skin, are perfectly proper.

POSTOPERATIVE REMISSIONS

Again, in estimating the value of surgery in cancer there is not only the question of mere prolongation of life, but of what may be called postoperative remissions during which the patient feels well or greatly improved and may for a time become productive and, therefore, of value to his family and the community.

---

[1] Moschcowitz, A. V. Ann. Surg., August, 1926.

Let us take, for example, cancer of the rectum untreated, and let us assume, for the sake of argument, that without operation the expectation of life is a little more than two years.[1] During this time there will be constant aggravation of the symptoms and the patient will become progressively miserable until the end. Now, contrast this with the great improvement which follows a colostomy. There is relief from pain and gain in weight and strength, with the possibility of returning to work, provided the occupation is not one of physical stress. Life will be prolonged; but, even if it were not, the state of existence is far preferable to that before the operation.

If, during an attempted radical procedure, it becomes evident that the extent of the cancer forbids its extirpation, the resources of surgery may still not have been exhausted. The re-establishment of function may bring relief both mental and physical, even though the malignant disease remains. The many short-circuiting operations are instances of this. Granted, we are merely putting off the evil day, but "what," as Heywood Broun remarks, "is better to do with an evil day than to put it off?"

RESULTS OF EDUCATIONAL CAMPAIGNS

Now, what evidence is there that the campaign of education by the American Society for the Control of Cancer and by other similar organizations for the past 12 years is bearing fruit? Is it a fact that patients come earlier for radical treatment and, if so, are they sent by their physicians or do they come to the surgeon on their own initiative?

This question is one which is not easy to answer in a scientific manner. There are few statistics available and I freely admit that mere impressions in regard to facts of this kind are liable to be fallacious. Moschcowitz,[2] in an analysis of a series of over 200 cases in 9 years, concludes that there has been an apparent gain of only one-half month in the time of waiting between the first suspicion of cancer and the entrance to the hospital for treatment. While, at first sight, this may seem a disappointing proportion, to me it appears to be the exact opposite.

In the short period of our Society's existence, an organization had to be built up and a plan of action developed. This alone has taken time and a World War came between to interrupt, but, fortunately, not to destroy, the good work. If 8 per cent represents the gain up to the present, may we not look for 50 per cent or more in the near future? And there are other aspects to be noted. During this period of publicity I have observed decided increase in the number of patients who come for examination and who submit to operation for suspected conditions which turn out to be non-malignant. Bloodgood, also, mentions this increase in a recent paper advocating the wide excision of apparently innocent tumors, a proportion of which will be found cancerous on pathological examination.[1]

---

[1] Greenwood's tables, Brit. M. J., August 14, 1926.

[2] Loc. cit.

In a lecture before the Worcester District Medical Society[2] 13 years ago I reviewed a series of 65 of my own cases of cancer—not merely cancer of the breast—and found that the waiting period before consulting the surgeon was about a year. Now, although this mixed series may not be accurately compared with cancer of the breast alone, it does have a significance, and I should estimate from personal observation that the time of inaction has diminished by fully 50 per cent.

Dr. Major Greenwood[3] in a series of 324 cases of breast cancer noted a mean period of delay amounting to 1 year 2 weeks and 4 days. But the very fact that so many more patients with innocent tumors present themselves is surely an indication of improvement along these lines, for the patients do not know the nature of their lesions before the examination. In Bloodgood's paper he states that in his clinic the increase has been from less than 3 per cent, up to 1900, to more than 60 per cent since 1920.

I find that many more patients who suspect malignancy come to me for an opinion without having been sent by their physicians and I am frequently obliged to make careful inquiries to ascertain when they were first examined. The trouble does not seem to be a disinclination on the part of the medical men to act promptly in clearly diagnosed cases of cancer, but there is a strong tendency toward procrastination in the doubtful cases, although it is only by attacking these that the fight against cancer can be won. To wait for a diagnosis on purely clinical grounds is to invite failure when success is within grasp.

THE QUESTION OF HEREDITY

Although the question of heredity has not yet been definitely settled, yet animal experiments, notably those reported by Maud Slye, point strongly toward the transmission of a cancer tendency, and although the conclusions reached by investigations in human malignancy are at wide variance, it can nevertheless not be denied that when both parents have harbored cancer there is a liability that the children are potential bearers of the disease.

One weak point in coming to conclusions of this kind is revealed when one or both parents with a cancer tendency have died of intercurrent disease before the development of definite malignancy. This question of heredity, however, should not affect the attitude of the physician, because in any doubtful case early treatment is imperative. For emphasis, I will repeat that the way to cure cancer is to extirpate all suspicious lesions.

---

[1] J. Am. M. Ass., July 31, 1926, p. 344.

[2] Boston M. & S. J., Jan. 22, 1914.

[3] See Brit. M. J., August 14, 1926.

THE EFFECT OF NEWSPAPER PUBLICITY

Newspaper articles exert a profound influence upon the public. In a recent number of the *Journal of the American Medical Association*, Dr. Harry Saltzstein of Detroit has demonstrated this fact with interesting charts, and he discusses the psychological explanation. In fact, there is probably no more penetrating force than the lay press to stir the feelings of the people of our land.

Whether or not we care to admit it, the medical profession as a whole reacts strongly to the demands of the public, and, although it may seem ignominious, it is nevertheless true that many advances in medical education have been made outside the established medical schools.

Without going farther into the matter I may simply call to mind the relation of homœopathy to the older school 60 years ago and today.

While the education of the physician begins at the time of his graduation, there is nevertheless an unfortunate tendency to laxity in keeping up with the medical progress on the part of those of us who are obliged to practice "for a living."

The average doctor is brought in contact with a public for the most part not his equal in education, and his mental standard slips. This can be corrected only by more frequent talks with those of his own intellectual class, whether of his profession or not. Probably the most potent influence to prevent this deterioration is the medical press and, almost as powerful, is regular attendance at professional gatherings. The man who reads his journals and who exchanges ideas with his fellows will necessarily advance whether he reside in a city of the first class or in a hamlet in the country.

Our problem is to set before the medical man clearly, briefly, and convincingly what can be done with his cancer patients and to make him appreciate the tremendous strength of his position.

No matter what improvements and advances may be in store in the technique, medication, and other scientific treatment of malignancy, surgery will always hold a foremost place in the line of combat, whether by diagnostic operative procedures, by direct attack, or by correcting mechanical or physiological faults brought about by the disease.

But the beginning of the war is in the hands of him who first sights the enemy, the man who practices general medicine. His responsibility is a heavy one, for success or failure rests with him. Once the public has been fully aroused as it has been in regard to some other diseases, notably tuberculosis, there will be a great change in the world's attitude toward the treatment of malignancy.

PROFESSOR W. BLAIR BELL'S METHOD OF TREATING CANCER

By FRANCIS CARTER WOOD, M.D., New York City
Director of the Crocker Institute of Cancer Research

THE use of lead in the treatment of cancer is not wholly new, for on page 91 of the English translation of Goulard's treatise on the *Effects of Lead*, published in London in 1769, may be read: "It is no new system to apply the preparations of lead in ulcerated cancers. Everyone knows how strongly they have been recommended. The reasons which forbid plasters and other external applications are of no force when urged against the use of this extract (of Saturn) by way of lotion or cataplasm. . . . If the application is continued, the cancerous tumor is observed to disperse; or at least ease is given the patient, which is no small point gained." Appended to these remarks are several clinical testimonials with a very modern sound, of which the following is a sample: "Not long ago I cured by means of the extract of Saturn cancers in two persons of distinction. Some time before I undertook a third, where the afflicted person was four and twenty years of age. In 15 days the tumor was considerably diminished, and soon after entirely disappeared."

The extract of Saturn is the acetate of lead still known as Goulard's extract. Obviously the astringent and bactericidal action of the lead, while it might assist healing of the ulcerated surface, would scarcely have cured a cancer, so that we must assume that in those days, long before the use of the microscope, the diagnosis of the cured cases might reasonably be in doubt.

The first really scientific attempt to use lead in the direct treatment of cancer was in the period following von Wassermann's publications in 1911 on the effect of selenium on animal tumors. For a number of years subsequent to that publication extensive experimentation was carried out, not only on animals, but on human beings, with various colloids, including lead. The administration of these colloids was found to be so dangerous that all therapeutic attempts were abandoned until about 1920, when Professor W. Blair Bell of Liverpool again took up the problem, with the result that real progress has been made. He had observed what he considered an elective toxic action of lead on the cells of the placenta, and believing that tumor cells were biologically related to those of the trophoblast, he began the treatment of human cancer by intravenous injections of various forms of lead.

PREPARATION OF LEAD COLLOID

In the preparation of lead colloid, the soluble salts, such as the acetate, were found highly toxic. The colloidal lead iodide preparations also were dangerous. Finally a mixture of colloidal metallic lead, hydroxide and carbonate, was made by the Bredig arc method, using a 0.4 per cent aqueous solution of gelatin as the sparking fluid, to which was added 0.027 per cent of calcium chloride. After 15 or 20 minutes of arcing between lead terminals the solution roughly contains 50 milligrams per 100 cubic centimeters. This is centrifugalized to get rid of the grosser particles measuring more than 0.2 micron. It is made hypertonic by the addition of 1.1 per cent of sodium chloride, 0.05 per cent of potassium chloride, and 0.05 per cent of calcium chloride. The lead content is then determined by a rapid colorimetric method and the mixture sterilized by boiling, and administered intravenously in doses not greater than 100 milligrams of lead. Under the microscope many of the particles are rod-like and transparent and are evidently not metallic lead, as the addition of ammonium sulphide blackens them.

The preparation is actually not wholly colloid but rather a mixture of colloidal lead compounds with a coarser suspensoid. The fact that a considerable amount of the lead settles out in a few days is further evidence for this assumption. Sterilization is not strictly necessary as the lead itself destroys bacteria. No growth can be obtained from an unboiled solution, but it is wiser to be on the safe side. Kept under ordinary conditions in stoppered bottles, it grows rapidly more toxic, for reasons as yet unknown. Probably, however, this alteration may be ascribed to the fact that more of the lead becomes oxidized and perhaps assumes an ionic form. The particles also agglutinate in time, and perhaps some of the bad effects observed have been due to vascular thromboses induced by the colloidal material. As a rule, during a single course of treatments, which requires about two months, 600 milligrams of lead are given.

CLINICAL SYMPTOMS DURING TREATMENT

The clinical symptoms which follow injection are a more or less marked rise of temperature which may be accompanied by chills, headache, and marked malaise. This malaise may continue for 4 or 5 days, and be accompanied by nausea, distention of the intestines, and a marked feeling of prostration. Within 3 or 4 days after the administration of a single dose of 100 milligrams of lead, the hæmoglobin may fall 20 or 30 per cent, the red cells being reduced correspondingly. Leucocytosis does not occur as a regular phenomenon. Other patients, especially those with less highly sensitive nervous systems, may receive an injection of 100 milligrams without more than a half or a degree's rise in temperature, and without any symptoms, except slight headache. Even those without a reaction, however, are apt to show anæmia. Heavy, fat patients can stand more lead, emaciated persons less, though this is not an absolute rule. Four or 5 days after the lead is given, numerous stippled red cells may be found in the smears, together with polychromatophilia, and anisocytosis. Occasionally large numbers of normoblasts appear. If the stippling reaches 2 to 3 red cells per field of the oil immersion lens, it is wise to discontinue the lead.

Moderate icterus is often observable. This passes off in 4 or 5 days, and is unquestionably due to a toxic lesion of the liver which will be described later. Occasionally, however, very severe jaundice may occur, with an enlarged and tender liver, evidently the expression of an acute toxic hepatitis. The van den Bergh test is positive and direct. The quantity of bile present in the urine is usually small. Hæmatoporphyrin is regularly present in considerable quantities in the urine. Some patients pass a Burgundy red urine, which shows the spectrum of hæmatoporphyrin without any concentration of the pigment. Some patients with apparently normal kidneys show casts and albumin after each injection, but this is not a regular phenomenon, and many have no renal symptoms. An unpleasant phenomenon occasionally observed is persistent vomiting which may necessitate complete abandonment of the treatment. Traces of lead may be demonstrated in the vomitus and may act as a local irritant on the gastric mucosa.

Despite the administration of such large quantities of lead, the patients are singularly free from evidences of injury to the nervous system. No cases of cerebral saturnism have been observed. A few transient neuralgias of the peripheral nervous system have been noted, and occasionally a wrist-drop with anæsthesia over the radial distribution, but none of the more serious and permanent peripheral paralyses such as are common in industrial poisoning. A lead line is often present. Marked stomatitis is not uncommon, and the patients may find it difficult to eat on account of the soreness of the tongue and the gums. For these reasons the teeth should be thoroughly cleansed by a dentist before the treatment is begun. Blair Bell has ascribed one case of fatal aplastic anæmia to the lead, but this may very well have been a coincidence. He reports a few deaths due to the toxic action of the lead on the renal tissues in patients whose kidneys were the site of an interstitial nephritis, though no evidence of kidney insufficiency could be obtained by clinical study, or chemical and microscopic examination of the blood and urine. In any case, the direct mortality from the lead is far lower in these hopeless and advanced cases of cancer than the accepted operative mortality in carcinoma of the uterus or stomach.

SELECTION OF THE CASES

The dangers and discomforts attendant upon the administration of the lead are so considerable and the results so inconstant that the method cannot be used in the treatment of operable tumors, and Professor Blair Bell rejects all such material. Another group which must be absolutely refused are those patients with obvious renal lesions. The administration of lead simply means that the kidney trouble is increased, and anuria is likely to follow from poisoning of the kidney substance, with the inevitable death of the patient. Severe anæmia, advanced cachexia, and exhaustion from the effects of extensive growths also are sufficient reasons for rejecting patients. These people cannot stand the strain of the lead injections, and the indiscriminate administration of lead in such cases will only bring discredit upon a method which is of value in suitable types.

The presence of cerebral metastases is also a self-evident contra-indication. In patients with pulmonary and bone metastases who are in good physical condition, it may be tried but the results are always doubtful. Those with very bulky irremovable tumors are also in general unsatisfactory patients. It is easy to see that if the lead divides itself in fairly definite proportions between the organs of the body and the tumor, as analyses show to be the case, patients with large tumors run much more risk of death from serious damage to the kidneys, liver, and bone marrow than do those with small tumors in which the amount of lead to be administered may be proportionally smaller. It is Professor Blair Bell's practice, therefore, to remove, if possible, a considerable bulk of such neoplasms, even going so far as to remove a large area of thoracic tissue in patients with cancer *en cuirasse*. He finds that the bare area rapidly repairs under the influence of the lead, especially if epidermal centers are furnished by grafting small areas. Extensive Thiersch grafting is not necessary.

TYPE OF TUMOR AFFECTED

Very slow-growing tumors, like the basal cell epitheliomata, are not affected, probably because their vascularity is so low that too little lead reaches them. No effective therapy has been found from the administration of lead in patients afflicted with squamous cell epitheliomata of the oral region, though secondary lymph nodes may shrink very considerably. The slow-growing, glandular carcinomata also as a rule are rather resistant. While in general no type of tumor can be described as especially susceptible, the experience of Professor Blair Bell and his colleagues has been that the rapidly growing vascular tumors have a greater susceptibility to lead than the other types. This shows a certain parallelism with the susceptibility to radiation. In this connection it is interesting that some of the cured cases were lymphosarcomata of the intestine, which are well known to be less malignant than similar tumors of the nodes. Here again there is a certain parallelism with radio-sensitivity.

RESULTS OF TREATMENT

Of the patients selected to undergo treatment, some 80 per cent are uninfluenced and the disease proceeds on its regular course to a fatal termination. The remaining 20 per cent of selected cases receive more or less benefit. The palliation may be very great, even if the tumor begins to grow soon after the administration of the lead is discontinued, but it is possible to give such a patient even when in a very advanced stage, relief from pain and healing of the ulcerated surfaces, and hence freedom from poisoning due to absorption of the toxic products which enables him to return to work for a period of 3 to 6 months. During that time the growth may begin to return, and the injections have to be repeated. There is evidently a limit to this, and in this particular aspect lead is not always so effective as radiation. The latter, by its obliteration of the terminal arterioles, cuts down the food supply of the tumor, and at the same time damages the neoplastic cells which therefore may remain dormant in the tissues for a considerable period. The lead does not seem to do this, and the renewed growth of the tumor may be observed in some instances very promptly after the effects of the lead have worn off. This unfortunately may be within a month or two and nodules which have apparently disappeared may recur with all their original growth capacity. For this reason I think it is important that the lead treatment should be combined with the simultaneous radiation in order to give the benefits of both types of treatment. If the patient is nauseated from the lead, the additional nausea from any radiation treatment will not make conditions much more serious. On the other hand, tumors which have originally been sensitive to radiation but have recurred and are then resistant may yield completely to lead.

In addition to the cases which are benefited and obtain palliation of a longer or shorter period, it may be expected from Professor Blair Bell's results that a small percentage, at present not definitely determinable, will be apparently cured. That is, they will remain free of tumor for 3 to 5 years. Professor Bell has a few such patients who have survived this period, and many others whose condition at the end of 1 or 2 years warrants the expectation that they will escape return of the disease. If the neoplasm does recur, and the patient's condition warrants a fresh course of treatment, it can be instituted, as the lead apparently produces no permanent damage to the organism. Examination of a large number of patients who have undertaken treatment reveals no rise in blood pressure, or other evidence of vascular or renal lesions; hence it may be reasonable to assume that the chronic arteriosclerosis which is seen in industrial lead poisoning will not be found when the lead is administered in a few large doses.

MODE OF ACTION OF THE LEAD

The mode of action of the lead is as yet but little understood. The removal of particulate matter injected into the circulation is extremely rapid, as Drinker has shown by the study of the distribution of manganese compounds. In all probability the lead particles are taken up by the reticulo-endothelial system of the tumor, the bone-marrow, the spleen, and liver, for these are the seats of chief damage, and lead can be found in them all by analysis. Caution must be used in drawing conclusions from animal experiments, because there is considerable evidence that in different species the topographic distribution of particulate matter differs very considerably. The studies of Aub, Means, and others have shown this very conclusively. In the rat the administration of lead causes severe lesions of the liver with the formation of focal necroses, very extensive destruction of the spleen, of the bone-marrow, and of the tumor. The tumor is often more seriously damaged than the organs, probably on account of the nature of its very defective capillary circulation, which leads in the case of large, rapidly growing neoplasms to spontaneous necrosis of the center of the tumor, the phenomenon correlated also with thrombosis of the veins and capillaries. Lead apparently greatly increases this necrosis and causes abundant thrombi to form in the capillaries, with a very extensive congestion of the periphery of the tumor. The degree of damage produced is quite beyond that occurring spontaneously. The probable action is that the absorbed particles of lead damage the capillary endothelium, setting free thrombokinase, which thus facilitates the formation of fibrinous thrombi, and then ultimately, as the lead takes on a soluble form and penetrates more deeply, there results a certain destruction of the tumor cells.

All of these facts observed in animal tumors seem to be present in human cases, for after the administration of lead, the patient frequently complains of severe pain in the growth, and this within a few seconds or minutes of the administration; in other words, far too soon for any toxic effect. It is easy to see how thrombi by checking the circulation of the tumor would give rise to œdema, and the swelling thus produced put tension on the nerves which lie in the capsule of the tumor. The pain cannot be due to any intrinsic nerves, as tumors have been shown not to have such an equipment. With the absorption of the necrosed products, the tumor gets smaller and the strain on the nerve filaments is diminished, and this corresponds to the clinical phenomenon that the pain passes off in 24 hours. Some patients are immediately relieved of their pain but as yet no explanation can be made of these individual differences. Human patients also have jaundice, which is probably due to the toxic effects on the liver just as is observed in animals, and their anæmia is correlated with lesions of the bone-marrow, which are observable in our experimental material. The animal tumors, despite large doses of lead, are actually cured in very few instances. It is perfectly easy to cause the necrosis of 90 to 95 per cent of the bulk of the tumor, but usually at the periphery a few living cells remain and from them a recurrence takes place. However, the results obtained from animal tumors cannot be directly transferred to human beings.

Many of the most striking cases which have been observed following lead treatment have been in patients with extensive lymphatic involvement of the thoracic wall in the form of cancer *en cuirasse*. In these individuals the cells are, as is well known, distributed in fine strands throughout the lymph channels of the corium and deeper structures. There can be no question of thrombosis here. That would imply necrosis of the entire chest wall. The toxic action must be the important factor in this case. But the difficulty of the situation lies in just this fact, that there are tumors whose cells apparently resist with the utmost success any toxic action of the lead, just as they resist any destructive action of radiation, and there are, on the other hand, tumors whose cells are sensitive both to the lead and to the X-ray. Unfortunately, it is rarely possible to distinguish these two types microscopically, and therefore it is necessary to treat a large number of patients in order to get a few successes. We cannot select, in other words, by any microscopic examination of the tissue, the cases which will prove favorable.

GENERAL APPLICABILITY OF THE METHOD

What is the general applicability of this method of treatment at present? Unfortunately attempts to produce a stable and hence marketable colloidal lead of the same type as that used by Professor Blair Bell have so far met with no success. Hence anyone who wishes to try the method must make and standardize the product in his own laboratory—a matter of considerable difficulty, as the toxicity rapidly increases. A given preparation of colloid can be used for 2 or 3 days only, and even during this period its lead content changes as a result of the settling of the coarser particles and the agglutination of the finer into aggregates.

To those familiar with salvarsan technique, the intravenous injection presents no difficulties, but many cancer patients seem to have a very poor surface venous supply, and occasionally a patient is encountered in whom it is practically impossible to inject the lead without incising the skin. This means 6 incisions for injection, and probably 3 or 4 more for transfusion, so that the available veins become rapidly exhausted by thromboses.

The treatment requires hospitalization, for many of the patients suffer severely in the first 24 hours after the injection, and it is not safe to give lead to an ambulant patient. Obviously the other effects from which the patients suffer, such as extreme nausea, prostration, or lead colic require hospital care.

One great difficulty is the expense of transfusions. Few hospitals have transfusion funds for ward patients, and donors rarely charge less than $50 for 600 or 700 cubic centimeters of blood. Assuming that all these difficulties can be satisfactorily met, there is still a large percentage of failures. Either the patient receives no benefit at all, or the severity of the toxæmia or colic is such that the patient declines to continue treatment. There is also the danger of sudden death from cardiac weakness, or anuria, but if the patient has been carefully examined beforehand, I think these are not to be weighed in the balance with the possibility of benefit. After all, the public quite complacently accepts the mortality of 5 to 10 per cent in hysterectomies, gastrectomies, or other difficult operations for the removal of cancer, and it would therefore seem that an occasional death from lead poisoning in cases of perfectly hopeless cancer should offer no basis for criticism. The psychology of the situation, however, is curious, and as long as it remains so those who are going to use lead should see that the patient's nearest relatives have an explicit understanding of the dangers of the treatment and the possibility of failure, in a carefully worded letter. This may prevent unpleasant discussion later.

It would seem wise, therefore, to limit the use of colloidal lead at the present time to well equipped institutions. It is certainly not a method for general employment by the practitioner. The idea seems to be fairly widespread among the profession, judging by the patients who have been sent to Professor Blair Bell for treatment, that the moribund can be healed and the dead brought to life. It is vitally important that a large series of the more frequent types of tumors, such as carcinoma of the stomach, recurrent carcinoma of the breast, recurrent carcinoma of the uterus, and carcinoma of the rectum be treated under the most careful supervision of competent physicians, and the results be tabulated and published. We shall then be spared the period of blind and unquestioning optimism which followed the introduction of radium and of high voltage X-ray, the reaction to which has caused a cynical undervaluation of the real palliative value of these two therapeutic agents.

FORMAL RESOLUTIONS PASSED BY THE SYMPOSIUM

THE FIRST RESOLUTION: MESSAGE TO GERMAN SOCIETY

The first resolution recorded the friendly interest on the part of those who attended the Symposium toward the German Central Committee for Cancer Research and Cancer Control which was holding its annual meeting at Duesseldorf, Germany. Following is the text of the telegram which was addressed to Professor Friedrich Kraus, who was presiding over the conference:

"The American Society for the Control of Cancer, meeting with many distinguished students of the cancer problem from the United States, Canada, England, France, Italy, Germany, Switzerland, Holland, and Belgium, sends you its best wishes for a successful meeting and expresses its sympathetic interest in your committee's work. Through research and education the scourge of cancer will yet be controlled. American Society for the Control of Cancer."

THE SECOND RESOLUTION: THE BASIS OF A UNIVERSAL CAMPAIGN

The second resolution expressed the unanimous opinion of the Symposium upon a list of practical facts and sound working opinions which should serve as the basis of the campaign which mankind should make against cancer. This resolution contained a preamble and fifteen numbered paragraphs,as follows:

"Resolved that the following statement of facts and opinions be adopted:

"Although the present state of knowledge of cancer is not sufficient to permit of the formulation of such procedures for the suppression of this malady as have been successfully employed for the control of infectious diseases, there is enough well established fact and sound working opinion concerning the prevention, diagnosis, and treatment of cancer to save many lives, if this information is carried properly into effect.

"1. The causation of cancer is not completely understood, but it may be accepted that for all practical purposes cancer is not to be looked upon as contagious or infectious.

"2. Cancer itself is not hereditary, although a certain predisposition or susceptibility to cancer is apparently transmissible through inheritance. This does not signify that, because one's parent or parents or other members of the family have suffered from cancer, cancer will necessarily appear in other persons of the same or succeeding generation.

"3. The control of cancer, so far as this subject can be understood at the present time, depends upon the employment of measures of personal hygiene and certain preventive and curative measures, the success of which depends upon the intelligent co-operation of the patient and physician

"4. Persons who have cancer must apply to competent physicians at a sufficiently early stage in the disease, in order to have a fair chance of cure. This applies to all forms of cancer. In some forms early treatment affords the only possibility of cure.

"5. Cancer in some parts of the body can be discovered in a very early stage, and if these cases are treated properly the prospect for a permanent cure is good.

"6. The cure of cancer depends upon discovering the growth before it has done irreparable injury to a vital part of the body and before it has spread to other parts. Therefore, efforts should be made to improve the methods of diagnosis in these various locations and the treatment of the cancers so discovered.

"7. The public must be taught the earliest danger signals of cancer which can be recognized by persons without a special knowledge of the subject, and induced to seek competent medical attention when any of these indications are believed to be present.

"8. Practitioners of medicine must keep abreast of the latest advances in the knowledge of cancer in order to diagnose as many as possible of the cases of cancer which come to them.

"9. Surgeons and radiologists must make constant progress in the refined methods of technique which are necessary for the diagnosis and proper treatment not only of ordinary cases but of the more obscure and difficult ones.

"10. There is much that medical men can do in the prevention of cancer, in the detection of early cases, in the referring of patients to institutions and physicians who can make the proper diagnosis and apply proper treatment, when the physicians themselves are unable to accomplish these results. The more efficient the family doctor is, the more ready he is to share responsibility with a specialist.

"11. Dentists can help in the control of cancer by informing themselves about the advances in the knowledge of the causes of cancer, especially with relation to the irritations produced by imperfect teeth and improperly fitting dental plates. They can also help by referring cases of cancer which they discover to physicians skilled in the treatment of cancer in this location. It may be doubted whether all dentists fully realize the help which can be obtained from X-ray photographs in revealing not only the state of the teeth but the condition of the bone surrounding them.

"12. Medical students should be instructed in cancer by the aid of actual demonstrations of cancer patients, and this to a sufficient extent to give them a good working knowledge of the subject.

"13. The most reliable forms of treatment, in fact, the only ones as yet justified by experience and observation, depend upon surgery, radium, and X-rays.

"14. Emphasis should be placed upon the value of the dissemination of the definite, useful, and practical knowledge about cancer, and this knowledge should not be confused nor hidden by what is merely theoretical and experimental.

"15. Efforts toward the control of cancer should be made in two principal directions: (1) the promotion of research in order to increase the existing knowledge of the subject, and (2) the practical employment of the information which is at hand. Even with our present knowledge many lives could be saved which are sacrificed by unnecessary delay."

THE THIRD RESOLUTION: THE ESTABLISHMENT OF AN INTERNATIONAL FEDERATION OF SOCIETIES FOR THE CONTROL OF CANCER.

The third resolution was in regard to a proposition made by Dr. Claude Regaud to the effect that an international federation of societies for a campaign against cancer be established chiefly to publish abstracts of all papers on cancer appearing anywhere in the world. In view of the fact that the action taken by the meeting was somewhat different from that proposed by Dr. Regaud and the discussion brought out various points of view on this subject, the proposition as stated by Dr. Regaud and a summary of the discussion, as well as the final vote on it, are here given.

Dr. Soper, as chairman of the committee, read the proposition. It had been presented in French, translated into English, submitted to the author and approved by him. Dr. Regaud's proposition follows:

Project 1

1. It would be of very great and general interest to establish a permanent union between the associations which are concerned with the campaign against cancer in all countries.

This union would have for its purpose an exchange of ideas, of news, and of publications, the organization of meetings from time to time, at stated periods or otherwise, and the giving of mutual aid for certain works that have a collective interest. It would leave full independence in all respects to the associations of different countries.

2. The union of associations against cancer would be realized by the adherence of the different national associations, and the establishment of an international bureau, whose members would be elected by the national associatons, for a definite period of time (3 years, 5 years . . .).

Contributions should probably be made by the different national associations for the purpose of defraying the expenses of the international bureau.

It would probably be desirable to decide that the international federation should admit within its organization only a single association for each autonomous nation. Multiple societies or sections of a single society that might co-exist in a country could be represented in the federation only on the basis of one unit for each country.

3. The regular exchange of news and publications between societies represented would permit each one of these to make translations of news items, communications, and articles of social interest, and to publish these in its own bulletin. Each member of a national society (or of a section of one) would in this way easily be kept in touch with important events in connection with the subject of the campaign against cancer throughout the whole world.

The organization of international meetings like the one in which the American Society has taken the initiative, at suitable intervals and under conditions carefully chosen, would be facilitated by the existence of such a federation.

4. But the most important end immediately in sight through the formation of such a federation would be that of facilitating to an extraordinary degree the scientific work of research workers throughout the entire world, by placing at their disposal an indispensable instrument of bibliographic documentation, as will be indicated in Project 2.

It is to be noted that the international federation would not have to engage directly in questions of scientific and therapeutic research.

Project 2

1. Explanation of aims. 1. The number of nations which have entered, within a greater or less period of time, or which are now entering, upon the work of scientific production is becoming greater every year. Every nation of any importance, as soon as it enters the field of scientific production, legitimately aspires to publish the works of its investigators in its own language. Thus it comes about that the German, English, Spanish, French, and Italian languages, which were the first scientific languages after Latin, are being joined by the Russian, Polish, Czechoslovakian, Hungarian, Japanese, Arabian, and other languages. The Dutch and Scandinavians, despite the great age and the high value of their scientific production, have had the wisdom and the self-effacement to have their works published in the three languages which represent at once the most ancient culture and the wildest diffusion of the sciences, namely, the German, English, and French. But there is little chance that this example will be followed, and nationalism in matters of scientific publication represents a stage which, although perhaps temporary, is at present unavoidable.

We must, therefore, not attempt to combat it but to reduce its disadvantages.

2. These disadvantages are enormous. They are such as to constitute a very serious obstacle to the advancement of all forms of science by rendering it more and more difficult to every worker to become familiar with the documents of the works of those who are treading the same path. Each one is more and more exposed to the danger of misunderstanding or of even remaining, in good faith, completely ignorant of the results of those who share his labors in other lands; of wasting his

time in researches that have already been made, and in arriving only at results that have already been reached. A still more serious disadvantage is that the more earnest investigators, who are not concerned to obtain publicity for their works, are exposed to the dangers that their advances and discoveries will remain hidden; thus they lose the most valuable recompense of men of science, which is the bringing to light of fragments of truth that they have come upon. Finally, and most important of all, it is evident that the very wide diffusion of facts and ideas is the best way of submitting these to the test of verification and discussion, and of making them the stepping stones to new truth.

3. However, it seems very easy to remedy these drawbacks by utilizing the co-operation of all nations for one common work of bibliography, susceptible of leaving to each one its complete linguistic independence. It would suffice to have a mutual understanding for the creation of a very simple international organization, which should be charged with the very wide dissemination of the list of publications and the abstracts of all works published in the entire world. An application of this idea would be desirable, and appears easy to bring about with regard to scientific work relating to cancer. Below are the main outlines of the organization which would be necessary for this.

II. Proposition. Recommendation I. Let us note at the outset that it would not be necessary to modify the organizations, scientific associations, or societies already existing in the different languages for the publication of original works. No bulletin, no archives, etc., need be suppressed or prevented from being written.

But it is strongly to be recommended that every author, in the common interest as well as in his own, should acquire the habit (already widespread) of having the text of every one of his publications followed by a well made abstract, written (1) in the same language as the text, and (2) in another language, to be chosen from among the oldest scientific languages (German, English, French)—to which it would be well to join as a third optional language, Italian or Spanish.

Thus the abstracts would be made by each author himself, which is evidently the best guarantee of exactitude as well as a definite piece of economy.

Recommendation II. Under the patronage of the international federation of societies for the control of cancer, there would be published an international digest—for which a Latin title should be chosen—for the purpose of collecting and publishing (1) titles and bibliographical notes (indexed) and (2) abstracts of all articles of a scientific nature published throughout the world on the subject of cancer. This international collection would appear in as many different editions and languages as there are nations or linguistic groups of nations desiring or able to defray the expense of their own editions.

Suppose that, at the start, there is a German, an English, a French, a Spanish, and an Italian group. Let us see what under such circumstances the French group would have to do.

The French group would have for its directive organization a publication committee for the French language, composed of French, Belgians, Swiss, and Canadians . . . . This committee would assume the responsibility for the French edition. It would have its editor at Paris, Geneva, Brussels, or some other city. Its subscribers would be the people interested in the scientific work on cancer and those who read French by preference. Among them would be found not only persons whose native language is French, but also Dutch, Scandinavians, Russians, Poles, etc., who put off for the time being the expense of an edition in their own language, preferring French if a foreign language must be chosen.

The committee of the French language group would have the following rôle:

a. By going over the publications in the French language, it would directly collect the titles and abstracts of French works and articles. (In case of need it would handle abstracts furnished by the authors, or would have abstracts made on its own initiative.)

b. It would have these bibliographical notes and abstracts printed immediately in its own edition, which would be published in the form of booklets.

c. It would receive, booklet for booklet, all the editions in other languages than French—that is, German, English, Spanish, Italian; it would place in its editions and have translated into French the abstracts of the German, English, Spanish, and Italian works. It would have these translations, as well as the biographical notes, printed in French, successively, in the booklets of the French edition.

d. It would receive from every national committee not having an edition of its own, bibliographical notes and abstracts prepared by this committee in one of the languages admitted for the abstracts; it would equally have these documents translated into French and published.

e. On its own part, it would fulfil the converse duty of making transmissions to all the other four, for the editions in other languages. This is how the committees of the language groups having an edition of their own would function.

National committees that have no edition of their own would confine themselves to the transmission of their own documents.

The regulation of this very simple machinery would be entrusted to an international committee depending upon the union of associations against cancer. This committee would establish in particular a common set of rules for the different editions, for the classification of the material, bibliographical rules, etc.

Any nation whose work might become important enough, and whose language might have a sufficient clientele of readers, would always have the right to create an edition for itself. Conversely, a nation or a linguistic group not having a sufficient clientele, would have the right to suspend its edition and to become merged with another group.

Each group would defray the entire expense of its own edition, and would have the independent use of the money coming from sales and subscriptions.

The necessary expense in places where sales and subscriptions should prove insufficient could naturally be met by the national societies for the control of cancer.

Questions of details would be decided by the Committee of Federation.

Such a work is one of the easiest to organize and maintain by an international effort, since it leaves complete autonomy to each country and at the same time renders an assuredly great service to scientists of the whole world.

DISCUSSION

DR. GEORGE A. SOPER: I have read to you the full document submitted by Dr. Regaud. It has been referred to the Committee and discussed by it. The Committee is inclined to consider the proposition favorably, but sees difficulties in the way of meeting the expenses and certain features of administration. The Committee thinks the subject should have consideration by the Symposium itself.

As Chairman of the Committee I suggest that this meeting pass a resolution referring the whole subject to the societies of the different countries with the idea that study be given by them to determine if it is possible to carry the plan out. Such approval would, in my opinion, be indispensable to the establishment of a sound and permanent organization such as is proposed by Dr. Regaud's interesting document.

I move the following resolution:

RESOLVED that the proposal for an international federation for the purposes stated by Dr. Regaud be endorsed in principle and referred back to each national society for study and recommendations as to further action.

DR. WILLIAM H. WELCH: We are indebted to Dr. Regaud for his able and carefully considered proposal and I hope it will be carried into action. For the present I think the wisest procedure is that which has been proposed by Dr. Soper, for we must not forget that this will be a step of great significance. I would call attention to the fact that there have been somewhat similar international unions and confederations. The bibliographical side should be carefully considered. In regard to this there should be consultations with our National Research Council and others in the same or related fields. I think a considerable sum of money might be available from them for bibliographical work along these lines.

What should be done by the various national organizations for cancer research and control is a matter for their further deliberation. I, for one, feel very grateful to Dr. Regaud for his carefully considered and interesting project and I hope it will be carried into effect along the lines he has proposed.

I second the resolution.

DR. RAFFAELE BASTIANELLI: I wish to say, in regard to the proposal for an international association, that there are many nations interested in this subject of cancer, and bringing it about will be a great help in the vital question of uniting the nations of the world. I believe the proposition of Dr. Regaud is a sound one and that we should express our approval of it in a general way without binding ourselves and submit the plan for the consideration of the several societies to which we belong.

DR. CLAUDE REGAUD: The project for a union among all the national leagues for the control of cancer will not require complicated machinery. I do not believe it is necessary to make the member pay very much. What I propose is a benevolent exchange of the publications of the societies connected with it and of the ideas they may have. The general proposition could now be approved and the details could later be submitted to special committees to be elected this evening. The immediate aim is to improve the bibliography of cancer. This bibliography is now very difficult to make and it will every day become more difficult.

In France, the Franco-Anglo-American League has begun to study this question. Every year the League spends a large sum of money to translate articles on cancer, and these are published in the *Bulletin* of the French Society for the Control of Cancer. The *Bulletin* generally appears with from 200 to 300 pages, but the League has the impression that the *Bulletin* is quite incomplete and it is too expensive. If every country would take the responsibility of having abstracts made of papers published in that country, the *Bulletin* would cost less and would be more accurate and complete.

If this Symposium believes that the proposition is not a wise one, then it would be best to leave the project in the hands of the Franco-Anglo-American League to get in touch with two or three similar leagues and carry out the plan as best it can.

MR. W. SAMPSON HANDLEY: We are indebted to Dr. Regaud for his suggestion. The only matter on which I am in doubt is whether this is the most simple way to accomplish the desired result. An International League implies an office with a staff. I believe this is unnecessary.

The object is to get an interchange of scientific papers on cancer, and if each society would get these papers which are published in its own country and have them abstracted in its own language, then the corresponding societies in other countries could deal with the papers as they wished. Countries not publishing such abstracts might make a contribution to those which do. In this way accurate bibliographies could be obtainable without the creation of another organization. If by an agreement between the national associations an interchange of abstracts could be assured, I think that would meet the case.

I am in favor of the resolution presented by Dr. Soper.

DR. ARCHIBALD LEITCH: The British Empire Cancer Campaign has begun the publication of abstracts of every cancer publication in the world. It has collected a sum of money and employs abstractors who are not only familiar with the foreign languages but are well acquainted with the subject of cancer.

We are starting the publication by issuing a volume a year and we will be very grateful for any papers or any publications that may be sent to us at once as we insist on these abstracts being made quite soon. Our staff endeavors to make them within two months after publication. The British Empire Cancer Campaign has considerable funds behind it. I should advise you to let us supply you with this journal. I do not believe it will cost you anything. It is very complete. Some of the articles we abstract are not worth it, yet we abstract them just the same.

The resolution was then put to vote and unanimously carried.

THE FINAL DINNER

The final dinner was presided over by Thomas W. Lamont, Esq., and the speakers included Professor Stephen Leacock, Professor William H. Welch, Dr. Wendell C. Phillips, Dr. Howard Canning Taylor, Sir John Bland-Sutton, Professor H. T. Deelman, Professor Henri Hartmann, and Professor Raffaele Bastianelli.

Professor Leacock's address was an eloquent and forceful denunciation of quackery.

Professor Welch announced the principal results of the conference and invited attention particularly to the statement of facts and opinions which had been agreed to. He said that the great note struck at the conference was the tremendous importance of the cancer question and the appalling problems it presented. There was never a time when tuberculosis presented problems of such magnitude. The general public and the medical profession must be aroused to the vital importance of efforts to control cancer. "However inadequate our knowledge is today," said Professor Welch, "it is an obligation of the profession to the general community that every effort be made to control this scourge. The community must be taught that all types of cancer are not certainly and inevitably fatal if they are recognized and properly treated at an early stage. Emphasis has been placed by the Symposium upon the importance of research work, the need of further additions to our knowledge on the one hand and equally the necessity of applying the existing information for the saving of many lives and much suffering on the other. There is no disease in which larger additions have been made to our knowledge than cancer, but because this knowledge does not reach the public it seems trivial. The many papers and discussions that have been brought out at the meeting will be published and will make a volume which will be an epochal contribution to our knowledge of cancer."

Dr. Phillips said that the meeting had done much to stabilize knowledge and would clarify opinions about cancer held not only by medical men but by the public. In this respect it would accomplish what no other meeting had done before. It was a great thing to preach up the right rather than to preach down the wrong and those at the Mohonk meeting had preached up the right. There had been no attacks on individuals or institutions.

Dr. Taylor described briefly what the Symposium at Mohonk had really been in his opinion. In the first place, the time of those present had been fully occupied each day from early morning till late at night either with the formal or informal discussions. He had been greatly impressed with the work being done in Europe. There was a growing interest in the subject of cancer everywhere and a definite demand on the part of the laity for correct information concerning cancer.

"Are we of the medical profession," asked Dr. Taylor, "going to teach the laity or are we going to wait until the laity comes to us demanding information? I think we should give the laity the things they should know." Dr. Taylor concluded by expressing the appreciation felt by the American Society for the Control of Cancer to those who had made the Symposium possible by their contributions of money and time.

Sir John Bland-Sutton declared that the meeting would make medical history. There had been a complete absence of acrimony, he said, and much work accomplished. The zeal with which so many investigators, surgeons, and physicians had come from all parts of the European and American continents was admirable and the earnestness they displayed at the conference was beyond all praise. In all his experiences at congresses and association meetings he had never been to one with a better setting than the Symposium at Lake Mohonk.

Professor Deelman said that the old proverb "the fault of the Dutch is in giving too little and asking too much" could be applied to the cancer research worker today; but everyone was doing his utmost to solve the great problems before him. Some had succeeded more than others but the discovery of the cause of cancer and the way to suppress it appeared to be still far off. On behalf of many of the foreigners, Professor Deelman expressed his appreciaton of the value of the Symposium and of the many courtesies received.

Professor Hartmann thanked the toast master for the opportunity afforded him to express admiration and congratulations on the work toward the control of cancer being done in America and on the success of the Mohonk Symposium. The American Society for the Control of Cancer had been well organized, as had been the Symposium which it had brought about. The papers and discussions had been very important and those who had participated in the Symposium were to be felicitated upon formulating the simple statement on the control of cancer to which the Symposium had agreed.

Professor Bastianelli expressed cordial appreciation of the opportunity afforded him to take part in the Symposium and promised to spread the news of the meeting upon his return to Italy. It was a most important gathering.

LANE MEDICAL LIBRARY

To avoid fine, this book should be returned on
or before the date last stamped below.

Aug. 1, 1927
AUG [illegible] '27
MAR - 1 '29
OCT 16 '29
SEP 18 1930
Feb. 5 '32
Feb. 11 "
FEB 17 1932
AUG 23 1932
JAN 11 1934
OCT - 5 1934
APR 7 1967
DEC 5 1973

Printed by R. R. Donnelley & Sons Company, at Chicago, Illinois, U. S. A.

L261 Amer.soc.for the control
A56 of cancer.
1927 Cancer control. 66408

NAME	DATE DUE
[illegible] July 29	Aug 1, 1927 AUG 1 1927
	Aug 29 '27 AUG 29 1927
Ces. S. Cadellas	MAR 18 1929
Lorenz	OCT 16 29
B. Freedlander	JUL July 31
H. D. Chope	1930
E Elhes	SEP 18 1930
J. Flynn	FEB 13
H. O. Baker	Feb
Freeburn	
M. Simatova	
Kane	
A. Penn	
F.	